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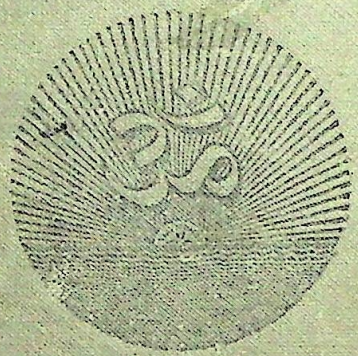
THE VEDIC GODS

— AS FIGURES OF BIOLOGY —

V. G. RELE, L.M.&S., F.C.P.S.



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THE VEDIC GODS

AS FIGURES OF BIOLOGY

BY

V. G. RELE, L. M. & S., F. C. P. S.

Author of
"The Mysterious Kundalini"
and
"Bhagawad-Gita—An exposition"

Sri Pratap Singh
Library
Srinagar.

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Author of "Vedic Hymns; translated from the Rig-Veda with introduction and notes"

AND

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Professor of Anatomy, Grant Medical College, Bombay

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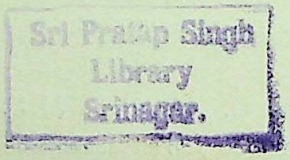

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FOREWORD

By

Edward J. Thomas, M.A., D.Litt.

Author of "The Life of Buddha" and "Translations of the Rig-Veda Hymns."

It is now more than eighty years ago that Horace Hayman Wilson began to translate the hymns of the Ṛig-Veda. At that time Vedic interpretation in the proper sense hardly existed. In fact the means of translating the hymns were not then available. What Wilson did was to give Sâyaṇa's interpretations in all the obscure passages—and they were not few—and even to follow the commentary when the natural translation was otherwise. At the time this was inevitable, and it was quite proper, as it still is, to learn from Sâyaṇa everything that he could tell us.

But Sâyaṇa's problem was different from that which confronts us now. To him the mantras were verses which had been used for ages in ceremonial practices, and in connection with these practices they had acquired meanings which we cannot assume were thought of by the ancient seers. What he gives us is a faithful account of the traditional interpretation of his own time. Probably he never realised that the world of primitive Vedic thought might have been something very different from the religious atmosphere of the fourteenth century, after thousands of years of mental strivings as seen in the labours of the Brâhmaṇas, the Upaniṣads, and the philosophical systems. But the problem that faces us now is to determine, if possible, what was this early world of thought, and it has been the central problem for the last hundred years.

The first step was made by Rudolf Roth (1821—1895). He saw that what Sâyaṇa tells us is not final, and this famous utterance *Los von Sayana* ('get rid of Sâyaṇa') had led or misled scholars for a long time. I have met a noted Vedic Scholar, a pupil of Roth, who refused to look at Sâyaṇa. Yet there was one solid result of Roth's work. His own Vedic studies (largely embodied in the great St. Petersburg Lexicon) and work like Grassmann's Dictionary to the Ṛig-Veda, were attempts to determine the meanings of Vedic words apart from later accretions. There is no doubt that they carried Vedic studies a long stage further.

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But Vedic studies were still far from the goal. They were no sooner freed from the illusion that Sâyaṇa is the last word than they were straightway beguiled by the mirage conjured up by Max Müller and his followers. For Max Müller the problem was not merely to find out exactly what the Vedas said, and what the seers exactly meant. He started with a theory or several theories. He thought that in getting back to Vedic times he had got back to the origin of religion. He made a theory as to what this origin was, and tried to support it with a theory of the origin of the language and with the evidence of the Vedas. Religion was supposed to have originated in the worship of natural objects, and every divine name had to be interpreted in the light of this theory with the ignoring of other forms of religion, and even of facts to be seen in the Vedic religion itself, which point in a quite different direction.

The etymological theories on which many of Max Müller's results were based and his Aryan theory have been swept away, but his Vedic theories are still a mirage for English-speaking students. Even Mr. Tilak's theories, however revolutionary in some respects, rest fundamentally on the view that we are to look for what Macdonell calls a 'physical basis' in explaining any particular divinity. This looks like a case of stalemate, when no theory can claim general acceptance. Even when we think of German scholars, Ludwig, Kaegi, Pischel, Geldner, Oldenberg, or of the French school, Bergaigne, Regnaud, Henry, it cannot be said that Vedic studies are in a healthy state.

Nothing therefore that will rouse complacent dogmatism and send scholars back to a renewed study of the text, with perhaps a new key, or as Dr. Rele expresses it, a new angle of vision, is to be welcomed. On Dr. Rele's present work I have not yet formed a considered judgment, for this must be done with text in hand and with due weighing not only of the evidence that is adduced, but of other possible interpretations. It will help the scholars of India to realise, as we are learning in the West, that the great problem is not yet solved. Its independent outlook and new theories may point out a way of advance which has so far eluded our view.

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FOREWORD

By

Y. G. NADGIR, M. S.

Professor of Anatomy, Grant Medical College & Fellow of the University of Bombay.

I have read with great interest the manuscript copy of Dr. V. G. Rele's Book on 'Vedic Gods'. He has approached the problem with a conviction that the Hindu scriptural texts are books of a biological nature and he has tried to interprete the Vedic Gods from a biological point of view particularly in relation to the central nervous system. He is led to believe that the Vedas are books on the physiology of the nervous system written by the ancient Vedic seers in symbolical language and that the Vedic Ṛishis were well acquainted with the normal working of the nervous system. He points out that the different theories which have been put forward from time to time by Vedic scholars both Indian and Foreign are hopelessly inadequate to explain satisfactorily the description of the Vedic Gods given in the Vedic texts and observes that a biological interpretation alone gives the key to their proper understanding.

I feel no doubt that Dr. Rele has accomplished the task with ability and skill. He has ably succeeded in making out a case for his ingenious theory. He has given abundant evidence of scholarship, scientific attitude and remarkable powers of observation in presenting his thesis and his arguments carry conviction to the reader. The anatomical and embryological facts stated in the book are accurate and one feels as one follows his account of the Vedic Gods, how very modern the knowledge of the nervous system as shown by the Vedic seers is.

Although it is difficult to predict whether his theory will find favour with the Vedic scholars or not, there is no doubt that it will take the learned world by surprise in as much as it is a genuine attempt to bring before the Vedic scholars a new angle of vision which greatly helps to elucidate the most obscure and unintelligible passages about the shape of the Vedic World and its Gods and as it throws a new light on their interpretation.

It is a book well worth having, well worth reading and well worth studying.

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AN EXTRACT

FROM THE HISTORY OF SANSKIRT LITERATURE.

By C. V. VAIDYA, M.A., LL.B.,
Author of "History of Mediœval India", "Epic India", "Riddle of Râmâyana" &c.

DR. V. G. RELE'S NEW EXPLANATION OF VEDIC DEITIES.

Dr. V. G. Rele, L.M. & S., F.C.P.S., whose new interpretation of the Bhagavadgita we have already noticed, has suggested a new explanation of Vedic deities also on the physiological basis. Dr. Rele has studied the Ṛig-Veda deeply and with his wonderfully imaginative power and his intimate knowledge of anatomy has evolved the theory that the Vedic deities represent the several centres of activity in the nervous system of the human body. I have had the privilege of reading in manuscript his book expounding this theory and I am sure that when this book is out, it will take the learned world by surprise. He has not only accounted for the various attributes of each Vedic deity but has also shown how the various legends about each god given in this highly poetic work of the ancient Ṛishis can be explained.

Even in the time of Yâska, the Vedic deities had become a riddle. Some teachers thought that they were powers of nature looked upon as gods; others that they were ancient kings. Thus Vṛitra was supposed by some to represent a cloud; by others to be a son of the Asura Virochana. Modern Vedic scholars generally explain the Vedic deities and the legends connected with them on an astronomical basis. They explain these legends as poetical fancies of the ancient Rishis suggested by particular appearances in the starry regions. Some again believe that these deities represent but the Sun in its different aspects seen in the Arctic regions. Even Yâska thought there were three deities only, viz. Sun, Wind, and Fire; and all other deities were but their different positions. But it is patent to all that these different theories cannot satisfactorily explain all the attributes of the Vedic deities described in the Ṛig-Veda, nor all the legends in connection with them found therein. Thus, as pointed out by Dr. Rele, the deity Rodasi in the

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dual defies proper explanation. Even Yâska gave different meanings; and many following him take it as heaven and earth (Dyâvâpṛithivî). But in many hymns of the Ṛig-Veda, Rodasi is mentioned along with earth and sky separately (X.88.3) and there Rodasi must mean two heavens. Now in the outer world there is but one heaven. The idea of two heavens, however, seems to have been suggested by the two hemispherical brain vaults placed side by side as well explained by Dr. Rele in his book. The Ṛishis in their animal sacrifices must have studied anatomy and even human dead bodies and they saw minutely both the inner world and the outer world and thought them to be alike. We may next mention the next most troublesome Vedic deity viz. the two Aśvins. Yâska as usual suggests many explanations. The astronomical explanation that they are two stars or two planets (Venus and Mercury) fails; for these do not constantly appear together. The Aśvins are always said to appear in the early morning before dawn. They are physicians. And they succour men when foundered at sea. It is almost impossible to suggest an explanation which can bring in these attributes. Dr. Rele's physiological explanation is, therefore, worth noting. Other troublesome deities such as Ṛibhus and Pûshan are also explained in this theory of Dr. Rele. Indeed his great merit is that he has collected together all the legends connected with each deity found in the Ṛig-Veda as also all attributes and has explained them on the theory that the Vedic deities represent the different centres of activity in the brain and the spinal cord of the human body. It is possible that the Vedic seers knew the human nervous system well and looking upon the outer world as a replica of the inner world described both in the same fashion. This theory of Dr. Rele will certainly be carefully scrutinized by the learned world when it is placed before it. The German Pandits who are both good Vedic scholars and Medical experts will study it deeply and pronounce their valuable opinion upon it. In the meanwhile, we think the theory to be so ingenious and thorough-going, that we feel it to be our duty to briefly notice it in this History of Sanskrit Literature, even before Dr. Rele's book is printed and placed before the world.

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PREFACE

It is my conviction that a majority of Hindu scriptural texts are books on subjects of a definitely biological character. A study of these books in that light led me to my bringing out the two books, "*The Mysterious Kundalini*" and "*Bhagavad-Gîtâ—An Exposition*", in the former of which I have tried to explain that our Yogic and Tantric books relate to the Autonomic Nervous System and its control by certain physical practices mentioned in the Hatha Yoga, while in the latter I have tried to show that the Bhagavad-Gîtâ is a book dealing with psychology and the process of unifying the mental powers when their harmony of working has been deranged. These sacred books, I hold, could not have been written by their authors without a thorough knowledge of the functioning of the nervous system on which our physical frame is heavily dependent, seeing that it is the key of human activities, both abstract and physical. The question naturally arises, have we in our ancient Sanskrit Literature any books pertaining to the physiology of the nervous system? So far no such book has been traced, and, even if such ones exist—as they probably do in the case of anatomy—their symbolical method of description is perhaps wrongly interpreted, so as to distort their original significance. It is very unfortunate that, during the period between the 2nd and the 6th centuries B. C. when great scientists flourished, there should not have been one who could claim physiology as his special subject. In Varâhamihira we had the greatest astronomer of the age, in Suśruta the greatest physician, in Pâṇini the great grammarian, and in Patañjali the great expounder of the Yogic philosophy. If we go still further back to the Upaniṣadic period we have two great anatomists, Yâjñavalkya and Aitareya. It may be that physiologists had their existence earlier still and that they wrote their works in symbolical and allegorical language which has remained a riddle to be solved. Personally, I believe that these books do exist but that most of the research scholars, not being acquainted with the science

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of biology, are wont to interpret their symbolism as referring to the knowledge of God derived from his works by the light of nature. The interpretation of our scriptural texts on this basis has landed them into difficulties, for they have not been able adequately to explain certain knotty passages which are explicable only on a biological basis.

My acquaintance with the Ṛig-Veda, mostly through the medium of English translations, leads me to believe that the Vedic Ṛishis were well acquainted with the normal working of the nervous system in the body and that its physiology lies hidden in the mysteries of the Vedas. If we can once prove that the ancients had as much knowledge as we have at present about the nervous system or perhaps more, we can in a sense refute the statement made in some quarters that Hindu medicine lacks a proper study of physiology. Suśruta, the great physician, had this knowledge. He definitely mentions in his Saṃhitâ that all Gods mentioned in the Vedas have a permanent existence in the body. He perhaps held the key of interpretation of the Ṛig-Veda but it seems to have been either lost or destroyed after his age, and the Vedas remained a mystery to be speculated upon according to the individual viewpoint of various commentators. Different theories about them have come into existence, but these, I believe, are hopelessly inadequate to explain even a small portion of all that is said in the Ṛig-Veda about the Vedic Gods. The latter view led Lokamanya Tilak to propound a new theory based on the Arctic residence of the Aryans and the cosmic circulation of the aerial waters. Even this theory, ingenious and scholarly as it is, is not capable of explaining the physical appearance of the Vedic Gods, which is given in some detail by the Vedic Ṛishis. To be acceptable, a theory must be such as not only adequately to explain the personification of the Vedic Gods but to explain their activities in a straight and simple way, without stretching of facts and with some degree of precision according to the scientific knowledge now at our disposal.

It is only a biological interpretation of the Vedic Gods that will satisfactorily explain the majority of the points raised in

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the development of a theory regarding them. This theory has its clue in the Vedântic statement that what has its existence outside in the external world has also an existence in the internal world located in the body. The Biological theory has this novelty that no writer in the Ṛig-Veda from Sâyaṇa to the present day has taken the biological view-point to explain the various problems connected with the Vedic Gods. I am conscious of the fact that it will be hard for Vedic research scholars to accept my theory, as my exposition from the embryological, anatomical and physiological points of view will be difficult for them to grasp without a proper knowledge of these branches of biological science. However, to shrink from presenting one's views on this ground alone would perhaps be construed as lacking confidence in one's own theory. To make the theory understandable, I have tried to make mine explanatory even at the risk of repetition.

Only the prominent deities of the Ṛig-Veda are selected for explanation of the biological basis. It is impossible to explain all the Gods and their biological meaning as the facts stated about them 4000 years back may not be true at the present day or it may be that we are still ignorant about the physiological functions of the parts of the body which they represent and have yet to rediscover them; this is particularly true of the physiology of the nervous system, as disagreement and contradiction on questions relating to the cerebral functions is still a feature of modern scientific journals. Human life from start to finish has been a riddle and is likely long to remain so. Whether, for instance, conscious, subconscious and unconscious activities, as volitional, sensory-physical and physical manifestations respectively, are due to the force of habit or the educative effect of the nervous system or whether they are manifestations of that residual something—the one-All on different planes of being—which remains unexplained by any known system of science had better be left out of speculation.

My conviction as a whole leads me to believe that the Vedas are books on the physiology of the nervous system written by different Vedic seers. They describe its structure and functions in a language

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which is full of metaphors taken from the natural phenomena connected with the place inhabited by the authors. The biological view-point solves the riddle of the Ṛig-Veda from within outwards and establishes uniformity of activities as between the inner and outer cosmos. The method of interpreting the internal by the external also facilitates discovery of the location of the original habitat of the primitive Ṛig-Vedic seers, the ancient Aryans as a race, for the peculiarities of the Ṛig-Vedic dawn and the Rig-Vedic sun suggest that the Ṛishis must have had their abode in a place where the period of the dawn, which extends over some months of unconscious and subconscious activities of the human being as infant and child, as well as the rising of the sun which represents the beginning of conscious activities and its lingering over the horizon of the Ṛig-Vedic world for a long time must be in strict conformity with the natural phenomena of the place. To search for a symbolic dawn of long duration and a symbolic sun of a still longer resting period on the horizon, we should have to move the habitat of the Vedic seers northwards towards the Arctic regions, for a long duration of both on the horizon is not to be found near the equatorial regions. That that region about the Arctic zone was habitable in the inter-glacial period is a hypothesis based upon geological and archaeological evidence given by Tilak in his book "The Arctic Home in the Vedas" and is independently supported by Warren in his book "Paradise Found". But in examining this view-point it must, at the same time, be borne in mind that the Vedic dawn and the Vedic sun, when once they appeared on the horizon, never disappeared, i.e., never set over the Ṛig-Vedic world. The Ṛishis, for the purpose of describing of internal physical phenomena, had a nearer approach to them in the northern regions which they occupied and with which they tried to harmonize their working. The persistent continuity of the dawn and the sun over the horizon is in itself sufficient to establish that in their descriptions the Ṛishis had in view an entirely different Universe from the one which was seen and felt by them externally. Though the Biological theory does not come into conflict with the Arctic theory as regards the location of

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the ancient Aryans, yet it differs widely from the latter in that it does not assume anything beyond what is stated in the Ṛig-Veda. The Arctic theory for instance assumes that the Waters mentioned in the Ṛig-Veda are the aerial waters, and their cosmic circulation is employed to elucidate some of the phenomena of the Ṛig-Vedic world.

In presenting this new theory my only object is to bring before Vedic research scholars a new angle of vision which elucidates obscure and unintelligible passages about the shape of the Ṛig-Vedic world, its cosmogony and the gods that reside in in it, passages not satisfactorily explained before by any theory.

It is very hard to forsake one's belief in the theories of old, for they have gathered a force of tradition behind them. Their presupposition, however, that the world viewed by the Vedic seers is the outside one only, must be replaced by a new theory, if the latter is found to be sound both logically and scientifically. I trust my critics will keep open and impartial minds, testing all evidence in a fair and just manner in the light of facts known to modern science, and that they will deliver judgment only after gaining acquaintance with my theory of the shape of the Vedic world and its working without fear of how far-reaching the ultimate effects of such a theory may be.

It would be ungrateful on my part not to mention here the books that form the basis of this thesis, for without their aid it would have been impossible to evolve a consistent theory. A list of these works is appended at the end of the book.

In conclusion, I desire to express my thanks to my friend Mr. S. S. Mehta, B.A., who alone has stood by me and encouraged me to write on my newly conceived interpretation of our scriptural texts. My thanks are also due to Dr. Miss Maneck K. Navalkar who has done the whole typing of the manuscript for me at great personal sacrifice.

Parekh Street
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V. G. Rele

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"*In the Kalama Sutta Buddha says: 'Do not believe in what ye have heard; do not believe in traditions because they have been handed down for many generations; do not believe in anything because it is rumoured and spoken of by many; do not believe merely because the written statement of some old sage is produced; do not believe in conjectures; do not believe in that as truth to which you have become attached by habit; do not believe merely on the authority of your teachers and elders;—after observation and analysis, when it agrees with reason and is conducive to the good and benefit of one and all, then accept it and live up to it' (Anguttara Nikâya, quoted in Transact of the Parl. of Rel., vol. ii p. 869).*"

—From The Vedânta Philosophy by F. Max Müller K. M.

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THE VEDIC GODS

As Figures of Biology.

INTRODUCTION.

The ultimate end of all religions of the world is the realisation by an individual of his 'oneness' with the divine. That 'like attracts like' is an immutable law of nature and in order to attain this oneness with the divine, it is necessary for man to develop in himself some elements similar to the divine element. Although, of course, from the time of his birth man undergoes changes in certain ways, these changes are not material; the essence always remains the same, ever unchangeable. To gain a consciousness of this divine essence, to see unity in diversity and to bring this essence in man to the front in his physical aspect is really the philosophy of the Upaniṣads. These works mark the end-knowledge of the physical aspect of the body, its structure, its working and its abstract qualities. The more one reads them, the stronger does the conviction grow that they relate to the living body; particularly so if the reader is conversant with human anatomy and physiology. A blending of anatomical and physiological facts (masked in allegorical forms) with abstract psychological truths is there clearly evident in the teachings of the Upaniṣads. The Upaniṣads being the end of the Vedas we might also enquire whether these latter also are really mystical books divinely inspired, or books on the scientific subjects of morphology and physiology. In face of the voluminous stereotyped interpretations that have been given of the hymns of the Vedic seers, this may at first appear to be a very bold suggestion. The abstract psychological teachings of

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the Upaniṣads may be shown, however, to contain very valuable results of the scientific thought of our ancient seers, results which derive confirmation from modern scientific research. Even in cases where the knowledge of modern science is still insufficient to solve certain psychological problems, our ancient seers will be found to have offered convincing solutions.

The psychological part of the Vedic and Upaniṣadic teachings has been rightly interpreted by later scholars ; but the part which deals in symbolical language with the structure and working of the human body yet remained a mystery to them. Speculative and ingenious interpretations of these passages, which in fact deal with the structure and working of the human body, have led modern interpreters to evolve queer and fantastic theories, which perhaps were hardly dreamt of by the original seers, to whom, on the other hand, a knowledge of the human body was necessary for the attainment of Supreme Bliss. The Upaniṣadic seers knew that unless the structure and physiological function of the body, as well as its embryonic development, were fully comprehended, the abstract knowledge of psychology necessary to reach that Supreme Peace spoken of in the philosophical teachings would be unattainable.

The philosophical theory is centred round the idea that the individual is a copy in miniature of the cosmos, and that if he identifies himself with the cosmos, he becomes one with the Absolute, the source of all creation. In other words, the microcosm of the individual in the form of the physical aspect of the body is merged in the macrocosm in the form of Âtman, the Psyche which comes to an individual as the spark of the Absolute, an easy passage being found from one to the other. The anatomy of that part of the body by which the final goal is to be reached was well known to the Upaniṣadic seers, its working thoroughly understood, and they have always talked about these in allegorical language to bring about the realisation of the highest Sublime. The importance of the teachings of the Upaniṣads lies mainly in the fact that we are carried from the physical to the abstract and from the abstract to the etherial. In this lies the superiority of the Hindu Philosophy to

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that of other religions. By means of a knowledge of the physical aspect of the body and its working, one can regulate or put a stop to its functioning and thus excite the abstract qualities. When a knowledge of these abstract qualities is thoroughly mastered one reaches the very end of all that can be known, (the Veda) of the physical aspect, viz., the body; and when at last this state is reached, a man leads a life wherein varieties of experience do not cause either pain or grief, joy or sorrow, weal or woe.

This preamble is necessary to explain the view that the writer holds about the teaching of the Upaniṣads. Various critics and writers have classified the principal Upaniṣads according to the preponderance in each, of ideas of cosmology, morphology, epistemology, metaphysics and eschatology. They have, in fact, tried to bring the Upaniṣads into relation with the external Universe which they themselves could see and comprehend: they have utterly lost sight of the Universe within themselves, where a knowledge of cosmology is represented by that of embryology, of morphology by anatomy, of epistemology by physiology, of metaphysics by psychology and of eschatology by philosophy. Taking this as the basis of knowledge of the Universe within us, we can classify the principal Upaniṣads as follows :—

The teachings of the Íśa and Kena Upaniṣads are philosophical, the latter containing more psychology. The Aitareya, Taittirîya and Kauṣîtaki are mainly embryological and philosophical with fragments of psychological thought. The Kaṭha, Muṇḍaka and Śvetâśvatara are physiological and psychological with slight touches of philosophy here and there, while the Praśna, Maitreyî and Mâṇḍûkya are physiological and philosophical. The two great Upaniṣads, Bṛihadâraṇyaka and Chhândogya, which are held in such high esteem, are complete text-books on matters relating to the body and treat of its origin, structure and working both physical and abstract and also with philosophical deductions therefrom. In fact, they deal with embryology, anatomy, physiology, psychology and philosophy; and the paramount place they hold in the Upaniṣadic lore must be attributed to this fact.

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Serial No.	Name of the Upaniṣad.	To which Veda it belongs.	Classification.
1.	Iśa	White Yajurveda	Philosophical and anatomical Mantras 1-8. Psychological Mantras 9-18.
2.	Kena	Sâmaveda	Psychological Sec. 1-2. Philosophical and anatomical Sec. 3.
3.	Kâṭhaka	Yajurveda	Psycho-analytic.
4.	Praśna	Atharvaveda	Psychological 1-5. Psychometaphysical 1-6.
5.	Muṇḍaka	Atharvaveda	Cosmological and Embryological 1. Physiological 2. Philosophical 3.
6.	Mâṇḍûkya	Atharvaveda	Psycho-analytic on the basis of Logos.
7.	Taittirîya	Black Yajurveda	Anatomical 1. Physico-psychic 2. Psycho-physical 3.
8.	Aitareya	Ṛigveda	Cosmological 1. Embryological 2. Psychological 3.
9.	Chhândogya	Sâmaveda	Physiological Psychological. Philosophical on pantheistic lines.
10.	Bṛihadâraṇyaka	White Yajurveda	Do.
11.	Śvetâśvatara	Black Yajurveda	Philosophical and anatomical. Psycho-analytic.
12.	Kauṣîtaki	Ṛigveda	Allied to Taittirîya.
13.	Maitrâyaṇî	White Yajurveda	Do. Do.
14.	Mahâ-Nârâyana	Black Yajurveda	Theological. Eclectic School with psycho-analytical ideas not systematised.
15.	Nṛisinha-Tâpanîya	Atharvaveda	Psycho-analytic on anatomical lines. Psycho-analytic on pantheistic lines.

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If we recall to mind the various gods and terms mentioned in the Upaniṣads, we shall find that these are common to all the Upaniṣads. The names of the gods and the duties assigned to them are unchanging, and their worship leads step by step towards Brahman, the producer of all organic and inorganic things. Evidently, these names of gods and other terms which are common to all the Upaniṣads are taken from a common source ; it is difficult otherwise to explain how the same names and terms should have been suggested to different seers, some of them contemporaries of one another. The common source is the Ṛig-Veda, the oldest of the existing Vedas. There, the location and the physical characteristics of these gods, their functions in the Universe, their abstract qualities, are all very definitely mentioned in symbolical language. It is quite possible that the Upaniṣadic gods had their source in the Vedas and that the Upaniṣadic seers took the qualities found there as their basis to propagate psychological and philosophical truths which still remain unassailable. The Vedas do not teach philosophy proper, but describe only its background. The generally accepted view is that the Vedic gods are personifications of natural forces and natural phenomena ; but the description we find there of their location and physical characteristics leads us to think that the Vedic seers actually saw these gods as described. It is not a case of simple personification, but a description of something concrete with its functions and abstract qualities.

How these gods came to be included in the Vedas is a question difficult to answer. No one can honestly give much credence to the view that they are self-existent. These must have a source somewhere. These Vedic gods have certainly no super-physical existence, for in that case the various writers of the Vedic hymns would have seen them in forms differing according to the individual evolutionary attainments of each writer. We find, instead, great uniformity in all the gods, and it seems from this that the writers of the Ṛig-Veda received them ready-made from some common source of which they have not given any clue in their writings. They have kept it a secret to be inferred, and the secrecy of the

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source made them call this knowledge the most sacred of all knowledge. It is the inherent desire of man to see what is within himself, and, to satisfy this curiosity, the ancient seers probably opened the bodies of men to see the structure within. This had to be done most secretly in those days owing to the fear of being killed as cannibals or man-hunters ; and, for the same reason, the source of this knowledge could not also be revealed. It was, therefore, given out that this knowledge was acquired by divine inspiration ; the Vedic seers heard it from Brahman. Hence it was called Śruti.

It seems that the source of revelation of these Vedic gods is not the living body but the dead body. A near approach of this idea is mentioned in the apparently poetic statement in the Bṛihadâraṇyakopaniṣad that the Ṛig, Yajus and Sâma were all of them produced by the God of Death, that is from a study of dead bodies. This god coupled himself with a wife of his own creation, namely Speech, and brought into existence the knowledge which is in these Vedas. It is apparent from this that the morphological knowledge of the body was derived from an examination of dead bodies ; and it was described in detail with the aid of speech, which is the result of pressure exercised by impressions on the senses. The internal structure of the human body so excited the feelings of the seers that words came to them spontaneously ; and these Vedic seers, many of whom were Kṣatriyas, then personified the different parts of the body in terms of universal nature outside.

Till recently the dissection of the human body was carried on very secretly. The method adopted by the ancient Indian anatomist was that of fractional dissection : the body was carried to a lake or river and kept submerged for some days, the most easily decaying parts, such as the skin and muscles, first decomposed and could be peeled off easily after a study of their relation to surrounding structures. The body was then again placed in water, when the other parts also decomposed and were then peeled off after studying their structure in the same way. In this way the anatomy of the body in all its details was regularly studied.

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The various Sûktas of the Ṛig-Veda describe the location and shape of the various gods such as Prajâpati, Indra, Agni, Varuṇa, Mitra, the Aśvins, the Âdityas, Sûrya, Rudra, the Maruts, Viśvedevas, the Ṛibhus and others ; and each Sûkta has for its author an inspired seer by whom these gods were originally seen or to whom they were originally revealed. The curious fact is that these Ṛishis describe those gods and functions according to observations, and a majority of these observations are common to them all, a few new ones being added in some cases. The Ṛishis mentioned as the authors of the Sûktas are Gautama, Kaṇva, Bhâradwâja, Vasiṣtha, Viśvâmitra, Madhuchhandas and others. It looks as if these Ṛishis were authors of different treatises on a common subject, and as if these treatises were grouped together to form the Ṛig-Veda. The gods conceived of by them were not visible externally in their physical form in nature around, nor could the Ṛishis give out that they had seen them in the human body itself. An attempt was, therefore, made to link these gods and their functions with the working of the Universe around us. Thus the hymns of the Vedas have a double aspect : their authors so arranged their thoughts in a system of parallelism that the same description was made applicable to the internal and the external forces that sustain the Universe and also its miniature. The abstract qualities of the body, together with the philosophical deductions made, were very easily reconciled with the atmospheric forces of nature around. But when they tried to personify these external forces and to make them behave like human beings, they meant the source of their location and working to be found in the human body. That the gods of the Ṛig-Veda have a physical existence is definitely stated by Suśruta in his Saṃhitâ (compendium) where he advises a surgeon to protect the body of his patient from the baneful influences of these gods before performing an operation by the recitation of the Vedic Mantra which runs as follows :—

" I am about to practise the prophylactic incantation to guard thy person against the malignant influences of Râkṣasas and conjured demonesses, and may the good Brahma be graciously pleased

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to approve of its performance. May the Gods and deities and ministers of grace disperse and confound the hosts of wrathful Nâgas (celestial serpents), Piśâchas, Gandharvas and Pitṛis that might be maliciously disposed to strike thee in thy sickly confinement. May the spirits which stir abroad in the night and roam about in the sky and on earth defend thy person in recognition of thy fervent devotion to them. May the concourse of Brahma-begotten sages (such as, Sanaka etc.), the saintly canonised kings (Râjarṣis) in heaven and the sacred mounts, streams and oceans of the earth protect thee from evil. May Agni (fire-god) guard thy tongue, Vâyu (wind-god) protect thy breath, and Soma (moon-god), Parjanya (rain), Vidyut (lightning) and Stanayitnavah (clouds) preserve the healthy coursings of those vital winds in thy organism known as Vyâna, Apâna, Udâna and Samâna. May Indra, the presiding deity over all physical energies, keep thy bodily strength immaculate. May Manu defend the two side-tendons at the nape of thy neck, as well as thy faculty of intellect; the Gandharvas, thy faculty of desire; Indra, thy fortitude; Varuṇa, thy faculty of cognition; Samudra, thy region of the umbilicus; the Sûrya, thy eyes; Diśah thy ears; Chandramâ, thy mind; Nakṣatras, thy complexion; Niśâ, thy shadow: Âpah, thy vigour; the Auṣadhis, thy hair; Âkâśa, the space which is imprisoned in the body; Vasundharâ, thy body; Vaiśvânara, thy head; Viṣṇu, thy moral courage, Purushottama (the foremost of beings), thy energy of action (dynamical action of purposes); Brahma, thy self; and Dhruva (immutable being), thy eyebrows. *May these divinities, which perpetually reside in the body, ensure thy safe continuance in being and mayst thou enjoy a long life through their grace*". (Sutra-sthâna chap. V. 19, 33).

The various writers and critics of the Upaniṣadic philosophy have left entirely unanswered the question why the ultimate knowledge of the all-pervading Reality lay with the Kṣatriyas, the warrior classes. Were the fighters in those times better versed in the knowledge of wisdom and philosophy than the Brâhmaṇas, the priestly class? The evidence in the philosophical literature of the

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East is more in favour of the latter. The Brâhmaṇas by their sacrificial teachings, ceremonial rites and austerities, deluded their disciples into the belief that the Omnipotent Self existed as a single thing by itself ; whereas, according to the Kṣatriyas, it is the Infinite, at once the infinitely small and infinitely great. This is supported by the various Upaniṣadic legends where it is definitely mentioned that when a disciple of a Brâhmaṇa philosopher realised that the knowledge imparted by his Guru was not useful in solving the riddle of the Universe, he was directed to a philosopher of the warrior class for the satisfaction of his curiosity, and he obtained from him the knowledge of the all-pervading reality, Brahman. Whence the Kṣatriya philosopher himself gained the knowledge of Brahman is a mystery. It seems the Kṣatriyas, who were always engaged in battle, were better placed to cut up and dissect the living bodies of their enemies with the desire to search the abode of the Self that caused the body to live. They mutilated the body to realise that the Self is not the material nor in the material of which the physical body is composed, but that it is the all-pervading power, the Brahman, that is embodied as Âtman, which informs the earthly material that composes the body. In the language of the Bṛihadâraṇyakopaniṣad : "He dwells in the earth, but is distinct from the earth, of whom the earth knows not, whose body earth is, who is the moving power in the earth. This is the Self, the inner immortal ruler." This is the information that is imparted to the seeker of Reality by the Kṣatriya philosopher after various reflections on the impropriety of the proceedings of the priestly class.

If our thesis that the Vedic gods had an anatomical origin be conceded, the question that we must next consider is their location in the body. A clue to their location can be found in the Hiraṇyagarbha, the originator of all beings, who existed even before the first breath of the gods and who alone is god among all gods. Earth and heaven, mind and body, are its creation through the power that was infused into it by the self-sacrifice of Viśvakarman, the Creator. Hiraṇyagarbha is generally translated as "a Golden Egg". This translation of the mystic word, however, conveys no other idea except

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that the egg is the producer of the species to which it belongs, the adjective "golden" going with egg conveys no specific meaning. We must assign such a meaning to Hiraṇya which will appropriately go with Garbha. Amongst its various meanings the one that may best be associated with Garbha is 'semen virile' which is concerned in the causation of an egg, the result of the union of sperm and ovum. Garbha or the ovum is the abode of the sperm, and, as the ovum is quickened by the sperm, the word Hiraṇya-Garbha may in modern medical parlance be taken to mean the fertilised ovum.

It will be necessary here to go over the principles of the science of embryology in order to understand the importance of the translation suggested by us. "Embryology is the science which deals with the mode of origin, manner of growth and the ultimate birth of an entirely new being. The knowledge of this science throws a flood of light upon the fascinating and otherwise obscure problem of heredity. It links up the past with the present and joins the present with the future."

Every living creature, simple or complicated, animal or vegetable, man or jelly-fish, starts life as one single cell. Hence emerges the thought with which philosophy begins, the conception of the unity of the world, which later developed into monism, preserving through the veil of manifoldness the unity which underlies it. So highly complicated a life as that of a human individual is an organised community of cells, all of which, however, sprang in the first place from one single cell, the fertilised ovum (Hiraṇyagarbha) which is popularly spoken of as an egg. The fertilised embryo in its turn is derived from the union of two germ cells, one from the male parent and the other from the female parent. As long as these two cells remain separate entities, no reproduction occurs. They must unite to reproduce. The male germ cell (Puruṣa) must unite with the female germ cell (Prakṛiti) to produce a living cell (Jîva), a fact which forms the basis of the Dvaita philosophy of the Sânkhyas. But the Sânkhya philosophy neglects the force or energy which caused this union ; the Vedântists realised it and called it the creative energy of the Universe, so forming the basis of their Advaita

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philosophy. These germ cells have continuity behind them. They are derived in a straight line of descent from the fertilised ovum from which each parent sprang ; and thus the cycle is continued. The germ cell, passing through the successive lives, carries with it the tendencies and impressions of previous lives. These form the Karma of the individual, which manifests itself when the embryo is fully evolved into a living being. The man is composed partly of characteristics which are derived from pre-existing germ cells over the possession of which he has no control whatsoever, be they good, bad or indifferent. The characteristics are his from his ancestry in virtue of his inheritance. The fertilised ovum divides and subdivides itself into innumerable cells which go to form the structure of the body, and one of the earliest structures to form from these embryonic cells is the nervous mechanism of the individual. The dominance of man depends upon the wonderful capacities in his nervous system which has its origin in Hiraṇyagarbha, the god of gods.

To my mind the whole description of the Vedic gods and their functions refer to that portion of the Absolute embodied in us through the agency of Hiraṇyagarbha as Aśvattha the nervous system in the body. At a very early stage in the development of the embryo a groove makes its appearance which is subsequently to play a very important part in the formation of this most important structure. This is the medullary groove, the two sides of which rise and fuse together to form a canal which is known as the medullary canal. This canal, simple as it is, is destined to become the central canal of the spinal cord and the cavities in the brain known as the ventricles. The walls of this canal, which are composed of numerous cells, develop into the spinal cord and brain. The narrow lower part of the canal goes to form the spinal cord while the wider upper portion from which the brain develops very soon changes its character by the appearance of two constrictions at intervals which divide the brain-area into three distinct vesicles. From the lowest vesicle are developed the small brain, called the Cerebellum, the Pons and the Medulla Oblongata, that is, the struc-

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tures that go to form the Hind-brain ; the cavity of the vesicle assumes a rhomboidal shape to suit the growth and becomes the fourth ventricle. The middle vesicle develops into the mid-brain which is composed of the peduncles or stems of the brain and four rounded masses called the Quadrigeminate bodies ; the cavity of this vesicle assumes the shape of a tube—the Aqueduct which connects the upper ventricles with the lower one. The highest vesicle, by further processes of constriction and foldings, develops into Fore-brain which consists of two cerebral hemispheres together with their outgrowths of grey matter known as Corpus Striatum and Optic Thalamus, the eyes and the optic and olfactory nerves. The original cavity of the vesicle persists as the third ventricle and its two lateral offshoots penetrate the two cerebral hemispheres to form the two lateral ventricles of the brain. The brain with its two hemispheres, therefore, arises in the first place as lateral enlargements on the upper part of the Medullary Canal, the walls of which go to form the cerebral cortex. The most remarkable thing about this all-important part of the brain is that all the cells of the cerebral cortex appear to be produced during the life of the embryo in which consciousness is said to reside. This is just a bare outline of the progress of formation of the nervous system from Hiraṇyagarbha, the generator of all gods. The Vedic Gods, then, are perhaps strung together on the Aśvattha tree as different parts of the nervous system and were conceived by the ancient Indians in the form of the gods of the microcosm according to the similarity of their functions with those of the universe outside.

It seems probable that the Ṛishis of the Vedic hymns knew the anatomy of the nervous system in detail, or they must have taken this knowledge from previous authors as a basis for the writing of their treatises. It does not otherwise appear how they came to choose gods identical in name and physiological functions. The anatomical facts about the gods and their physiological activities are quite in keeping with our present knowledge. Whether the Ṛishis had a kind of X-Ray vision by which they located the different gods and knew their working or whether they actually dissected the body

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to know the anatomy of the nervous system or whether they made physiological experiments on animals to elucidate the working of the nervous system, it is, indeed, very difficult to say. It is an admitted fact that the ancient Aryan races were far more advanced in physical science than is yet recognised ; they had discovered much that has since been rediscovered by modern science and much also that has yet to be discovered. The ancient Indians were no mean astronomers ; they were also skilful physicians. The Hindu sciences of medicine and chemistry certainly do not seem to have been of foreign origin, and the ancient Indian had advanced considerably in these branches. It is, therefore, quite probable that in other branches of physical knowledge, such as biology, anatomy, and physiology, they had made a considerable advance in ancient times; and the clue to this knowledge remained as the secret of the Vedas wherein the Ṛishis arranged the substance of their knowledge in a system of parrallelism by which the same duties were ascribed to the internal as well as the external powers of universal Nature ; and they gave to their expression also a system of double values, the same language serving this double purpose.

In any case, that the Indian Aryans were conversant with the different parts of the nervous system is undeniable : some portions of the nervous system are even named by them from the resemblance either in form or quality to certain animals such as horse, cow, dog, bull, sow and others. This process of naming the parts is even now prevalent in anatomical works. The sacrifice of the horse which is advised in the opening mystic passage of the Bṛihadâraṇyakopaniṣad is, I believe, the sacrifice of the horse-shaped mid-brain where all the important centres of the organs of sense in the form of the gods of the mid-heaven, are located. Even in modern books of anatomy the elevation surrounding this horse-shaped area is called the Hippocampus (Sea-horse) Gyrus. If the brain is vertically bisected, we bring to view the horse-shaped appearance of the mid-brain and the medulla oblongata. The stimulation of the vital centres there excites the dawn of life and causes the fœtus to live. We are, therefore, advised to sacrifice this independent action at the altar of

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Prajâpati, in order to gain a higher conscious control over it. The essential theme of the Vedas is worship of or prayer to the gods to invoke the power within them to gain objects of desire, and the sacrificing on the part of the worshipper of certain undesirable courses of action so as to consciously control the gods who regulate such actions. Such sacrifices are for regulating and modifying the working of this bodily universe so as to realise the powers of the higher God who is concerned in the creation of the Universe. When this creative energy is excited in the body, the individual establishes his connection with the cosmic energy outside and tries to gain his liberty by becoming one with it. This fusion of energy within, with energy outside, forms the basis of Vedic religion, which consists of certain commands and prohibitions in the forms of worship and sacrifice, the greatest sacrifice suggested being that of Aśva, a horse, which is personified in the Ṛig-Veda as Dadhikara (horse) or Garutmat (eagle) according to the imaginative speculation of the Vedic seers on the shape they saw.

The boundaries of the location of this horse are also described in the Bṛihadâraṇyaka. There it has as its outer boundary heaven, which is formed by the cerebrum surrounding it ; the chest of the horse—that is the front portion of the medulla—is said to rest on the earth—that is, the bone, the earthy matter of the body. There is also a similar passage in the same Upaniṣad, the significance of which has not yet been understood. It is a discourse between Gârgî and Yâjñyavalkya on the immutable Brahman. This passage not only relates the nervous system to the surrounding structures but it also shows the media through which it works. The space in which water and air are woven like warp and woof is the sub-arachnoid and subdural space which is studded with reticulations. The substratum of this air and water is the earthy matter in the form of nervous tissue, the Gandharvaloka, and it surrounds the brain and the spinal cord. The supporter of this Gandharvaloka, is the Sun, the chief motor centre in the brain. This in its turn is dependent on the world of the Moon that is, on the sensory centres lining the ventricular cavities, by stimulation from which the motor centres

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alone can work. This region of the Moon is further reinforced by the world of stars, that is, by fibres from the sympathetic ganglia of the autonomic nervous system, and the world of stars is also in its turn reinforced by fibres from the cerebro-spinal system, the world of Indra which is again reinforced by fibres from the cortical layer of the brain, Prajâpati or Indra. This latter also receives stimulation from Brahmaloka or the aetherial world. In the dialogue between Yâjñavalkya and Gârgî, the former could not answer the question : who regulated these ethereal impulses ; and he checked her from asking any further questions. In fact, this discourse gives us in detail how an impulse coming from an unknown source travels along the nervous system to obtain its manifestation.

There are many other passages scattered throughout Upaniṣadic lore which have remained unintelligible to the critics and have been explained away as mystical or ritualistic passages. It will be seen now that, on the basis of anatomical or physiological knowledge, these passages can be satisfactorily explained.

The so-called cosmological knowledge given in the Vedas is really a knowledge of embryology in its conception but described in a language to suit the grandeur of the macrocosm which is all-pervading. Although it is not possible to reconcile that knowledge in the Vedas, particularly the various terms, with our present knowledge of it, yet it throws a flood of light on the origin of the energy that forms the main source of all organic structure. To understand our viewpoint, the gods and their functions as described in the Vedas must be reconciled with the different parts of the nervous system in the body, particularly the brain and the medulla where the all-important vital centres i. e. the gods that regulate the bodily universe are located. To understand the proper location of the gods and their functions and forms, we must first compare the nervous system which sustains the physical form with the universe outside.

The universe outside is threefold : the earth, the heaven and the air, that is, Pṛthivî, Âkâśa and Vâyu. The manifestation of

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this threefold division is dependent on cosmic energy which is beyond all these three, and which also shares the activities of those divisions. In the physical aspect, Pṛithivî, its activity is seen in the changes of growth and decay of all organic and inorganic things. In the abstract aspect, the atmosphere or Vâyu, the energy is seen in the various impulses that throb in the air and make us conscious of its activity. And, finally, in the ethereal aspect, Âkâśa, the energy remains as a latent force which is manifested in the form of the spasmodic activities of the universe.

The human body, as stated in our ancient Hindu literature is composed of five gross elements—Pṛithivî (earth), Âpah (water), Tejas (as fire) Vâyu (gaseous material) and Âkâśa (ether). Muscles, bones, glands, hair, nail and skin form the earthly element, various secretions in the body and blood are the watery element; impulses moving to and fro along the nerves which are concerned in the receiving of impressions from the organs of sense and discharging them to organs of action make up the gaseous element in the body ; the emotional activities of the body arise from the ethereal element ; while desires make up the fiery element of the body. Of these five elements of which the body is composed, Âkâśa and Vâyu remain as germinal spots in embryonic life. The light in the form of cosmic energy enters the body at birth and excites the gaseous element to activity which is then transferred to the Gândharva region i. e. the region which holds, sustains and enlivens our body and on which are dependent the growth and decay of everything in our physical form. This Gândharva region is the most important as it forms the embodied universe. It is the nervous system in the body. It has its heaven, atmosphere and earth. The heavenly region is formed by that portion of the nervous system which consists of the cerebral hemispheres popularly called the brain. The atmospheric region is the hind-brain which is composed of the medulla oblongata, the pons and the cavity of the fourth ventricle while the earthy region of the nervous system is formed by the spinal cord which is a continuation downwards of the medulla oblongata. In these different regions are located all the gods mentioned in the

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Vedas ; to every god is assigned a place in the universe as well as functions, both abstract and material, which he has to perform in the harmonious evolution of the body. These gods and their functions are interdependent and sometimes their functions are so closely connected that one cannot be talked of without the other, whereby dual divinities have come into existence. These divinities are part and parcel of one whole, although differently named according to their functions and locations. The individual praises of these gods sung in the Vedas only bring into prominence the idea of the part they play in causing the whole to exist. It is the harmony in their working that causes the universe to exist. All the gods are evolved in their embryonic life from a common source, viz., Viśva-karman (the All-Creator) and to that common source they are returned by worship and sacrifice.

For the understanding of the exact location of these gods a general description of the nervous system will be very useful. There are two kinds of nervous systems, one conscious and the other unconscious. The conscious one is the cerebro-spinal system, while the unconscious one is the autonomic system, which is both preservative and destructive in its activity, anabolic and katabolic. These two systems are, to a certain extent, interdependent in their activities. The autonomic nervous system supplies the necessary force for the transmission of thoughts, ideas and their manifestations to the cerebro-spinal system.

The cerebro-spinal system consists of the brain and the spinal cord. The brain is composed of grey and white matter. The grey matter, which is supposed to be the seat of consciousness, forms the cortical layer of the brain while the white matter is composed of innumerable nerve fibres that carry impulses to and from the cortical layer. In the hemispheres of the brain are located two cavities called the lateral ventricular cavities which are lined with two protuberances known as the Thalamus and Corpus Striatum. These cavities are full of fluid known as the ventricular fluid, and they join together at their lower end to form a hollow tube surrounded by a thick bundle of nerve fibres which support the two

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hemispheres of the brain. The bundles are known as the peduncles of the cerebri on which they rest. The hollow tube gets widened at the lower end and forms a rhomboidal cavity which has for its base elevations and depressions lined with grey matter which are the seats of the vital centres of the body. On its outer surface it is covered over with membranes which embrace the whole of the nervous system. This rhomboidal cavity too, is full of ventricular fluid which is continuous with the fluid that surrounds the cerebro-spinal nervous system through a hole in the membrane. From the posterior part of this cavity hangs the small brain known as the Cerebellum which encircles this cavity with its limbs which form a broad belt in the front known as the pons. From below the pons starts the medulla oblongata, the upward enlarged end of the spinal cord, and all the autonomic vital centres as well as the two olive-like bodies are located there. The narrow end of the medulla is continuous with the spinal cord and encloses a cavity which is continuous with the rhomboidal cavity mentioned above. This is, in brief, the anatomy of the nervous system. We can now, from the physical description of them given in the Vedas try to associate the Vedic gods with the different parts of the nervous system and their physiological functions.

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THE UNIVERSE

As Viewed By The Vedic Seers.

Before I describe the various gods in their character as biological conceptions, a clear idea of the Universe as conceived by the Vedic seers must be obtained, for the gods are described as the offsprings of Heaven and Earth (VII.35.11 ; X.49.2 ; X.65.9). The location of the various gods by the seers in heaven, air and earth and not in the nether world is suggestive of the idea that the Universe conceived by them was the whole visible expanse of the earth with its atmospheric region and the vault of the heaven above. These formed the stage whereon the gods performed their various activities (I.159.1). It is strange that the ancient Ṛishis have not spoken of the Universe in its popular conception of Svarga (heaven), Pṛithivî (earth), and Pâtâla (nether regions). Whether the seers had a knowledge of the nether world or not is unimportant for my purpose, for the gods have no existence there.

The triad of heaven, air and earth is a favourite theme of the Vedas (VIII.10.6 ; 90.6). The world is said to be composed of two halves, and each half is composed of the triad mentioned above. Each region of the triad is further subdivided by the seers into three, giving six divisions of each. The two halves of the Universe (I.160.2, 5) go in pairs and are united in their birth and in their home (I.159.4). Their going in pairs suggests their parallel course ; heaven, air and earth respectively, of one half is united with heaven, air and earth of the other half. An end-to-end attachment is not suggested as if they formed upper and lower regions of the Universe. In an end-to-end attachment the rising of the Sun on the horizon of one half of the world to cause light would cause darkness in the other half.

Figures in brackets refer to Mandala (Book), Sûtra (Hymn) and Ṛik (Verse) of Ṛig-Veda.

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THE VEDIC WORLD.

A diagrammatic representation of the shape of the world as described by the Vedic Rishis.

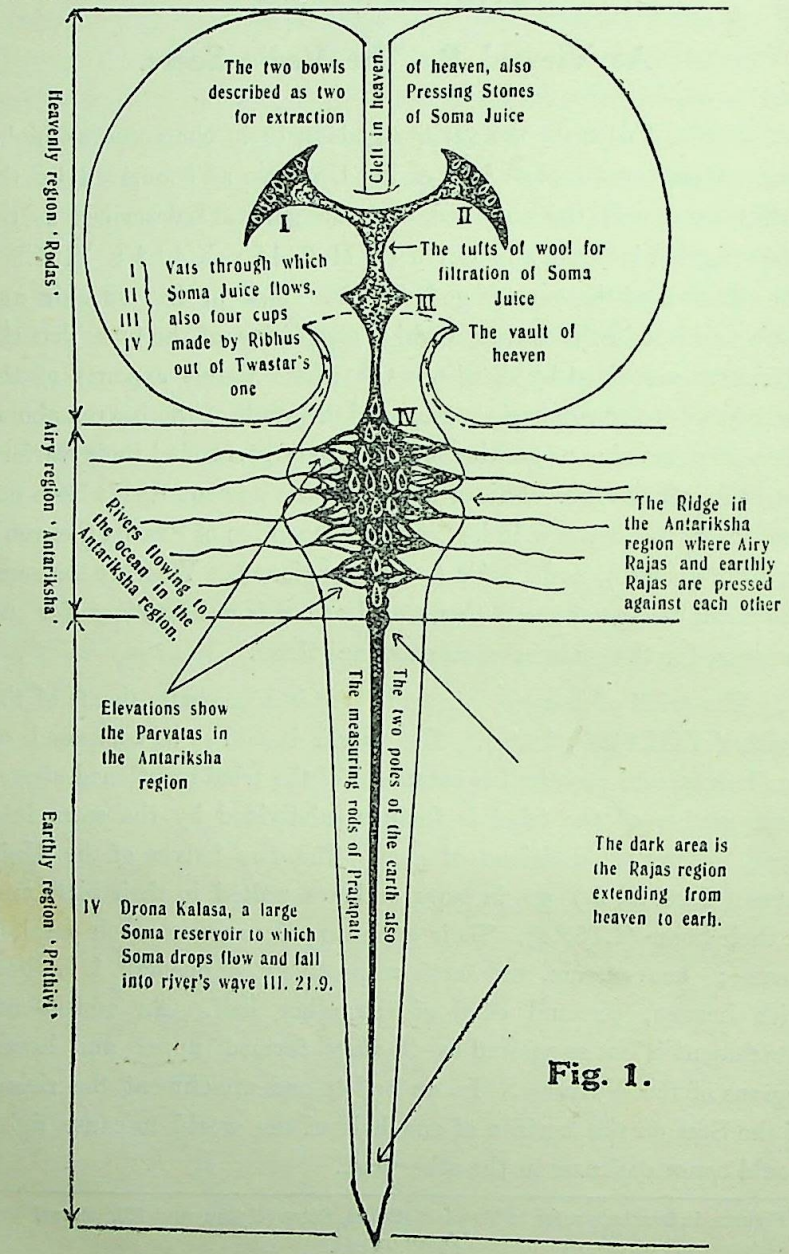

Fig. 1.

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In this conception of the world, light and darkness, day and night, would never run a simultaneous course, to meet together in a particular region above the earth, for, in the Vedas the kindred pair, day and night, is said to mingle in heaven and earth (X.10.9). The goal of the pair unlike in semblance–day and night—is to nourish the infant Agni and the three places of its birth, in mid-air, in heaven and in waters. The pair revolve like two wheels (I.85.1) on the Vedic world. The revolution of these two wheels over the world according to Wallis in his Cosmology of the Ṛig-Veda (p. 115), begins in the east and stops at the west to circle back again to the east without going below the earth. Though I am in agreement with the latter part of his statement, yet his conception of the rolling of the day and night has no sound foundation; for, then the pair are confined to the middle airy Rajas or Antarikṣa region only and do not extend over the whole length of the two Rajas regions, one in each half of the Vedic world (VI.9.1). The moving of the two wheels is not after the pattern of one following the other but of both running together a parallel course as if joined by an axle. This is only possible when two halves of the world run a parallel course; and this statement is expressly made in X.89.4, where it is stated that Indra is said to have fixed to his car the two halves of heaven and earth as with an axle. With such a conception of the simultaneous running of light and darkness, visible above on the earth, one cannot conceive of a universe whose two halves are joined together with the earthy regions to form upper and lower hemispheres. It may be that the Ṛishis viewed the two halves of the world as travelling parallel with each other and united in juxtaposition to each other. Then according to the Vedic idea of the universe, the pair—light and darkness—would be visible at one and the same time. The sun moving along the course of one half, keeping it in light, causes the other half to remain in the darkness of inactivity.

The shape of the earth as viewed by the seers is not what we are accustomed to see. The seers conceived the universe as made of wood and fashioned like a tree. The query in X.13.7; 81.4 is

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only about the particular kind of wood used to fashion the universe like a particular tree. Varuṇa is said to hold erect the stem of the tree on the baseless region, and its root is said to be lifted high up (I.24.7). The measuring of the two earths (Urvî in dual number) by the Father beyond the heavens with measuring rods shows the lengthwise expanse of the earth (III.38.3); for the measuring rods form a support to hold wide the broad expanse of the two heavens (Rodasî in dual number). The heavens are very often described as being supported with posts, but the mid-region, Antarikṣa of the world is said to be rafterless. (II.15.2; IV.56.3; X.49.1). It is located on the top of the framework of heaven i. e. on the top of the posts that support the heavens (I.56.5). The mighty Indra is said to have fastened firmly the region of air within the framework of heaven and earth. Viṣṇu also supports the vault of the heavens and fixes the earth to it with pegs (VII.99.3).

It will be seen from these statements that the Ṛig-Vedic earth is far from being circular. It has a measurable height. It is like the stem of a tree over which there is a vacant region abounding in streams and mountains which are said to be seven or eight in number respectively (I.35.8).

The two heavens are like two bowls turned towards each other (III.55.20). This description of heaven is suggestive of their hemispherical appearance. The high vault of the heaven and the front portion—the eastern pinnacle—of the earth are securely fixed together by the One. From this definite mention of a connection between heaven and earth in front, it may be inferred that the earth forms no connection with the heavens behind. The Vedic idea of the Universe is like that of two staffs placed together with a semi-circular bowl placed on each, as shown in the figure A on the next page. Though the two earths are united together, the heavens are kept apart from each other by Indra (VIII.37.4), Viṣṇu (VII.99.2), the Aśvins (X.24.4, 5) and Varuṇa (VII.61.4); i.e., their union is prevented by these gods. The shape of the universe is thus slightly modified as in the figure B. These two partners (the heavens) though parted, yet stand both on one firm support i.e. the pole

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formed by the union of the two halves of the earth (III.54.7). All living things which manifest action, they part and keep asunder. The two heavens do not get exhausted even though all the major gods located in them perform their actions through them on a lower plane (III.54.8). They (the gods) themselves are in secret and remote places. Though these gods work through the heaven (the brain) yet the latter is not their controller but the One-All who is placed beyond the heavens and who is lord of both the fixed and the moving.

The rafterless intermediate space—Antarikṣa—is located between heaven and earth. It is supposed to be analogous to the

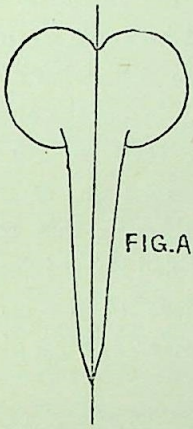

FIG.A

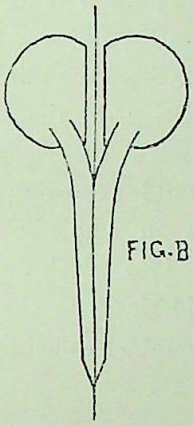

FIG.B

atmospheric region of the external universe. It differs from it in this that it is filled with water instead of being filled with air (I.12.4,6; VI.88.2). Instead of clouds and mists it has mountains and streams (I.32.2,12). The region is dark (Rajas) (I.35.4; VIII.43.6), and never bright, as it is enclosed in a cavity formed by the meeting of heaven and earth. Rajas is therefore made to be synonymous with Antarikṣa. This dark region continues downwards into the earth to form the Rajas of the earth and upwards to form the Rajas of the heavens.

The darkness of the upper half of the Antarikṣa region is continuous with the dark region of the heaven to form together the Rajas of the sky (Divorajas), while that of the lower half continues with the

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dark region of the earth to form together the Rajas of the earth (Pârthivam rajas). (I.85.5). These two dusky regions are further divided into three each, according to their run or course in the three-fold division of heaven and earth, thus giving us six Rajâmsi. Tilak interprets the location of these six Rajas as three above the earth and three below. According to this interpretation the earth forms the border-line between the two divisions and is itself free from the regions of Rajas. This conflicts, however, with the statement in the Ṛig-Veda where the mid-portion of Antarikṣa is definitely declared to form the border-line between the heavenly and the earthly regions of Rajas. Indra is said to have filled the earthly Rajas and pressed it against the Rajas of the bright sky (I.8.5). It seems the Rajas of the Ṛig-Vedic world is a continuous one extending from the third highest division of heaven to the third lowest division of the earth. From the elongated shape of the Ṛig-Vedic world the region of Rajas appears to be a hollow tube in that world extending to heaven and earth. The waters of Sindhu flow in ample volume through this realm (X.75.7). It is the space into which the purified Soma juice is poured from heaven, from mid-air on to the surface of the earth (IX.63.27). He (Soma) is therefore called the traverser of this place—Rajaṣṭura. (IV.84.4 ; X.8.3).

Savitṛi, the cosmic energy, moves through this dusky region by paths upwards and downwards (I.35.3). This energy causes the Sun to rise and spreads its lustre through the dark regions, (I.35.8). Once the sun has arisen over the Ṛig-Vedic world, no godless man from time remote can draw him down. He is ever above the horizon accompanied by darkness, but the manifestation of its light occurs only when he moves to the front portion of the Ṛig-Vedic world which forms its east (X.37.3).

It seems that the Vedic world has dark interior and bright outer regions, both being active (VI.9.1). The bright region is lighted or activated by Sûrya, while the dark portion through which the Sun lifts above the horizon is divided into portions called earthly and heavenly, and this region is lighted by the lustre of

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Agni (VI.9.1) through the agency of Savitṛi. A third dark region is also spoken of, which we cannot know. It belongs to Viṣṇu (VII.99.4) and is identical with his third stride which is beyond mortal ken.

All writers on the Vedas have taken the word Antarikṣa to be synonymous with Rajas. This is a source of confusion. Antarikṣa is a hollow space at the junction of heaven and earth while Rajas extends through the whole world. They are not identical.

In the foregoing description of the shape and regions of the Vedic world there does not seem to be any resemblance with the external universe which we know. We see around us a spherical universe, whose two halves are placed one above the other as two hemispheres, the Sun rises in the one to set in the other. The heavens are not supported on a pole. The cavity between heaven and earth is filled with air and has no actual mountains and streams in it. On the other hand, the Ṛig-Vedic world is elongated, the two halves being placed side by side to run a parallel course. The two bowls of heaven are perched on the earth as on a pole and there is a cleavage in the heavens. The Antarikṣa is filled with water and has mountains and streams in it. There darkness and light appear simultaneously and the pair mingles in the sky, while the Sun rises on the horizon and never sets but rises higher still. If we take these statements literally and without indulging in metaphorical interpretation, we will find that the Vedic seers in fact have in mind a world entirely different from the external one in its physical aspect, which they personified in terms of the external universe which they were accustomed to see. The unsatisfactoriness of a metaphorical interpretation may be judged by the number of theories put forward to elicit the proper meaning of the Ṛiks of the Ṛig-Veda. They all fail to explain what is said in the Vedas. All Vedic scholars, both ancient and modern, have been led away with the idea that the Vedic bards in their respective hymns have personified and praised the various phenomena of Nature occurring in the external universe, such as the glory of the spring, the raging of the storm, the beauty of the dawn and the magnificent lustre and energy of the Sun.

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Posterior view of the coronal section of the brain and spinal cord showing the shape to be indentical wtih the shape of the vedic world (Diagrammatic)

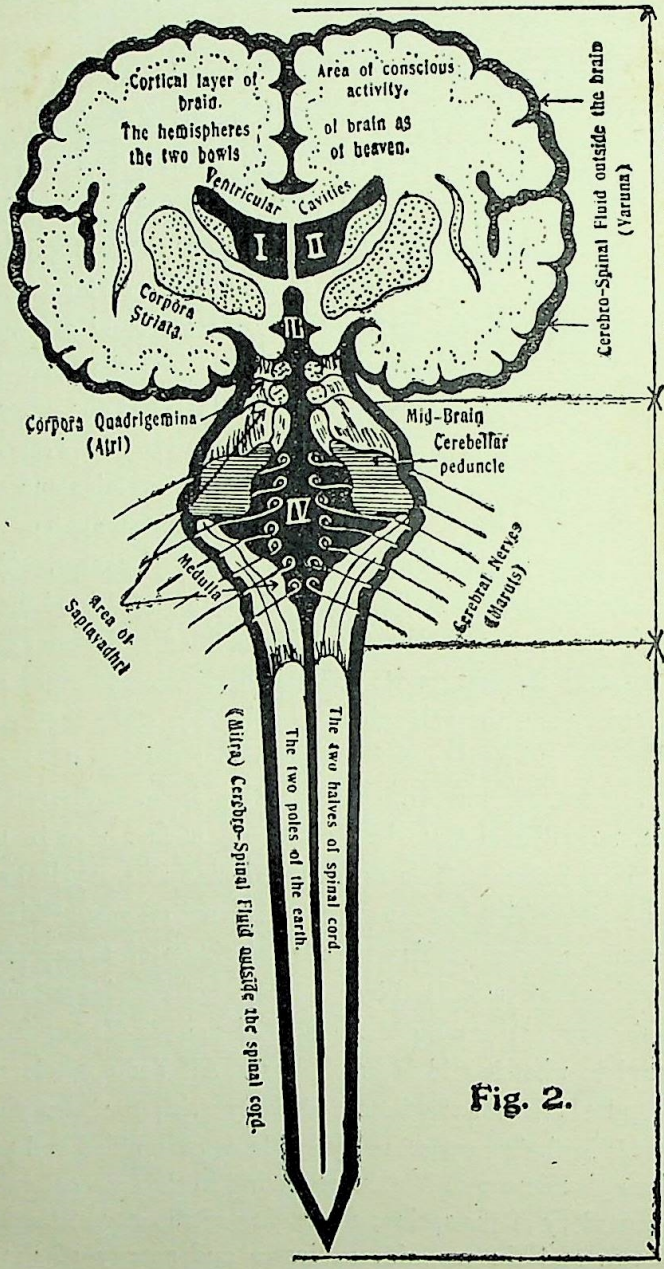

Fig. 2.

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These scholars have tried to interpret the verses in the light of these phenomena of nature and have assigned meanings to the original words which were perhaps not intended by the seers. This, I believe, is the cause of the contradictions and confusions which scholars see in the various hymns. This is the reason why the physical appearance of God is regarded as anthropomorphic, though in a shadowy manner, and it is supposed only to interpret aspects of their natural bases figuratively described to illustrate their activities.

Where can we find a universe such as that viewed by the Vedic seers? It has no exact replica outside ourselves. This is because it is a biological conception and is only to be found in the universe within, being enclosed within our bodies. It is in fact the nervous system which manifests itself through our various activities, conscious and subconscious. It is shaped like a tree and the material of which it is made, resembles soft wood in texture. Its consistency is midway between those of the soft and hard structures of the muscle and bone respectively. The various parts of the nervous system are personified as gods, animals, rivers, oceans, seas, strands, poles and the functions which these parts perform in the economy of human life are described in the language of natural phenomena occurring in the external universe as well as in the activities of animate and inanimate things, as viewed from the habitat of the Vedic Ṛishis on the earth. The physical attributes assigned to the gods show their relation with the surrounding structures, which are made to appear as their mouths, hair, lips, arms, hands, fingers, feet, legs etc. The god together with these relative parts is named after a horse, an eagle, an old man or some familiar figure from his resemblance to it.

In human beings the central nervous system is contained within the cranio-spinal cavity. It consists of the brain and spinal cord. The two parts are continuous, and the line of separation is arbitrarily drawn at the level of the opening at the base of the skull through which the spinal cord joins the brain. The external appearance of the wide expanse of the brain is hemi-

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spherical. It is divided into two equal halves by a furrow or sulcus thus giving the appearance of two inverted bowls placed side by side supported on the staff of the spinal cord which also is divided into two equal halves by a medial fissure extending along its whole length both in front and behind. This physical appearance of the nervous system tallies with the description of the world given in the Ṛig-Veda. At the rear of the spinal cord where it merges into the brain, there is, to support it, a hollow rugged surface with elevations and depressions. It has a membranous canopy which covers the whole of the nervous system externally. The cavity enclosed between the rugged surface and the membrane is filled with cerebro-spinal fluid as with a sea and forms the mid-region—Antarikṣa of the Ṛig-Vedic world. It is the area of centres which carry on impulsive and automatic activities. The seven streams that join the sea are the impulses from the seven openings of the organs of sense that move along the nerves whose centres of activity are described as mountains in the rugged portion of the Antarikṣa region. The cavity itself is devoid of any activity and is, therefore, called the dark region or Rajas. It is continuous with the central canal in the spinal cord forming the Rajas of the earth. Upwards, it continues to be in each hemisphere of the brain where it does not remain a simple canal but is enlarged at intervals into what are called the ventricles or vats. The highest ventricles are located in each half of the respective hemispheres of the brain. The Rajas of the Vedic world thus extends from the heaven (brain) through the Antarikṣa (meeting-point of the brain and the spinal cord) to the surface of the earth (spinal cord). It is filled with water, i.e. ventricular fluid which is a secretion from the ventricular surfaces. It is the region into which Soma juice—as the ventricular fluid is called after its purification through the vats—is poured. It is the bed of Sindhu over which its waters flow.

The central nervous system, considered as making up the Ṛig-Vedic world, is made up of two halves put together, each half carrying out the same function as the other half. The chief reason for the nervous system being in two halves is first for convenience,

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the body itself being generally two-sided, right and left; and, secondly, to ensure continued working in the vital organs which carry on automatic activities in the economy of life : if one half is deranged, the other half can take up its functions.

This explanation holds good for the portion where complete union between the two halves exists but not for the two hemispheres of the brain, which are separated to their farthest limits by a furrow and which rule the muscular activity of the body. Though the two hemispheres are separated from each other in order to carry on independent functions, yet there exists between them a perfect division of labour in respect of control of those muscular movements which are of a voluntary nature, i.e., movements of which we are conscious. Indra as a conscious force is thus said to separate the two bowls of the heavens. The right half of the free surface of the brain has centres of voluntary movement which govern the left half of the body, while the left half of the free surface has centres that govern the right half of the body. This separation of the working of each hemisphere of the brain is brought about by an arrangement of efferent fibres issuing from them which cross each other as they enter the spinal cord and govern the right and left half of the body. These efferent fibres or Aśvins are said to separate the two bowls of the heaven. The spinal cord by a prolongation upwards of its two halves supports as with pillars the two hemispheres of the brain. Under the name of Viṣṇu it is said to separate the two heavens.

The spinal cord is made up of motor and sensory fibres which have their regulating centres—the corpus striatum and thalamus, respectively—located at the base of the brain. As long as these two regulating centres remain unconnected, the latent activity of the sensory fibres is not manifested in muscular activity. In the Ṛig-Vedic world these fibres are said to roll upwards as darkness and light like the two wheels joined by an axle—the connecting fibres of the reflex cavity between the two basal ganglia—to mingle in the sky, that is the base of the brain. The darkness, or the latent activity of the sensory fibres is illumined by Agni, i. e. the

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thalamus. This darkness is displaced by light of Sûrya—the corpus striatum—which is manifested as the muscular activity when it moves on the front—the east of the Ṛig-Vedic world.

Our present anatomical knowledge of the nervous system tallies so accurately with the literal description of the world given in the Ṛig-Veda that a question arises in the mind whether the Vedas are really religious books or whether they are books on anatomy and physiology of the nervous system, without a thorough knowledge of which psychological deductions and philosophical speculations cannot be correctly made.

If this be true, we can surely assume that the Ancients were as far advanced in all branches of Science as we are now; perhaps they knew much more than we know of scientific subjects and specially of the nervous system of the human body, for the true significance of some passages and Ṛiks of the Ṛig-Veda cannot be made out because of our present imperfect knowledge of the nervous system and the difficulty is still more enhanced by the symbolical aspect which the description of the anatomical facts and physiological functions wears.

The two worlds combined with their divisions and subdivisions are grouped together by the authors of Vedic hymns under the name of Dyâvâ-pṛithivî. The earth alone is variously called from its breadth Urvî or Pṛithivî, from its greatness Mahî, from its expanse Uttâna, from its unboundedness Apâra and as forming the substratum of the universe it is called Bhûmi, Kṣmâ, Gmâ and Kṣâ. The heaven is called as Rodas, Div, Vyoman and Rocana.

Whether the words Rodasî, Pṛithivî or Kṣoṇî (in the dual) are representatives of heaven and earth or two worlds as translated by ancient and modern interpreters of the Vedas, is a point which requires discussion here. The three words in the singular would mean heaven, earth and earth; but they are made to include all the visible expanse of the universe as soon as they appear in the dual. It is difficult to conceive how Rodas could include the earth, or Pṛithivî could include heaven though it is true that the one cannot

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be conceived of without the other; therefore, they have used the expression Dyâvâ-pṛithivî.

The Vedic seers have viewed the universe as made up of two halves, therefore the word Rodasî in the dual can only mean two heavens and Pṛithivî, two earths. The authors of the Vedic hymns had the same meaning in view. Rodasî, in the dual throughout the whole of hymn 105 of the first book addressed to Viśvedevas, whose location is in heaven, is translated by all interpreters as heaven and earth or the two worlds. The verses in the hymn are descriptive of the powers of the various gods, assigned to them by Prajâpati, who alone is the director of this single universe. His will is manifested through the Viśvedevas located in the heavens who are their directors. It is the power of Prajâpati which works through the two heavens, "Vittam-asya-me-rodasî". The earth, therefore, cannot be combined with heaven when the seers speak of Rodasî (in the dual). There are a few verses in which "Dyâvâ-pṛithivî" occurs as a separate personification in addition to Rodasî, Pṛithivî and Urvî all in the dual (VI.70.1,4,6). Might the Ṛishis have done this to suit the metre? It is not credible. The qualities of both the two heavens and the two earths are definitely described and are lauded together under personification of Dyâvâ-pṛithivî.

Rodasî (in the dual) is said to be the regent of the earth (bhuvan) and is invoked to pour into us the general stream that makes men prosper (VI.70.2). This is conclusive proof that Pṛithivî is not included in the dual of Rodasî. It means two heavens and not heaven and earth as orthodoxy or tradition translated it. There is a verse, III.54,3, where Rodasî (in the dual) and Pṛithivî (singular) occur together. Here, too, the word Rodasî is usually translated as 'heaven and earth' or the 'two worlds'. By such a translation the proper meaning of the verse cannot be elicited. If the seers had the meaning in view which is assigned to Rodasî (in the dual) by the commentators, old and new, of the Veda, where was the necessity of specially mentioning Pṛithivî either in the singular or dual with Rodasî in the same verses? There is also a verse, X.88.3, where Pṛithivîm Dyâm, Rodasî (in the dual) and Antarikṣam are grouped together in one line.

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Why should the seers have definitely mentioned Rodasî in the dual ? Certainly not with the idea of including earth in its meaning, for the component parts of the world are separately mentioned by them. Nor can we translate the word Rodasî (in the dual) as 'two worlds' to tide over the difficulty as is done by some commentators, for, then there would exist a third world, in the grouping of the heaven, the earth and mid-region of the air, of which there is no mention in the Vedas. I believe it is the misconceived representation of the Ṛig-Vedic world that led the commentators to assign the meaning of 'heaven and earth' to Rodasî (in the dual). They never perhaps believed that there existed a world elsewhere which the Ṛishis viewed and described and which has, unlike the world outside, two Rodas, an Antarikṣa region and a Pṛithivî.

The Vedic seers, therefore, always talked of the world as made up of two halves which were inseparably joined together in the earthly and atmospheric regions but were separated by a cleft in the heavenly region. These two separate heavenly regions they could only talk of as Rodasî (in the dual). In the light of this explanation Vedic scholars will have to modify their views and retranslate some of the verses to elicit their proper meaning to suit the world as viewed by the Ṛig-Vedic Ṛishis.

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TVAṢṬṚI.

If we once accept that the Vedic world is the nervous system in the body or the universe within us, the personification of the God Tvaṣṭṛi becomes easy of explanation, and his obscurity in the Vedic pantheon, due to ignorance of the science of biology, immediately disappears. His being an artificer of all forms and all cattle in the Vedic world (I.88.9), suggests his embryonic existence as a nucleus of the Vedic world. As a skilful and crafty workman (I.85.9 ; III.54.2), he creates and shapes the whole world with his axe (VIII.29.3) so as to include in it all gods as well as animal and human forms (I.85.9 ; III.54.12). He shaped for Indra the bolt with which Vṛitra was killed. He manufactured a sacrificial cup (I.20.6) for the gods to drink their beverage (I.161.5 ; III.35.6). The Ṛibhus established their superiority over Tvaṣṭṛi by creating four cups out of the one manufactured by Tvaṣṭṛi. Tvaṣṭṛi created Agni who is said to be his son (I.95.2). He is the universal father that existed even before the created world and everything within it and is therefore called Agraja (IX.5.9). The activity of Tvaṣṭṛi does not cease with the creation of the world only, but he is even said to have fashioned for the gods the receiving and discharging elements as consorts to manifest their activities (X.10.5). Later on, Tvaṣṭṛi is overpowered by his own creation, the chief culprit being Indra who kills Vivasvat, the son of Tvaṣṭṛi (I.80.14). He is not able to regulate the activity of the created world, this function being taken over by Indra (X.49.9). He then lies alone and takes shelter in the harem of the gods.

If we consider the embryonic development of the nervous system in the fertilised ovum Hiraṇyagarbha, we can place the god Tvaṣṭṛi in it. The fertilised ovum, formed by the union of sperm and ovum, is an embryonic cell which divides and subdivides itself to form a mulberry-like mass which arranges itself (without going into further details) into the germinal layer of ectoderm, mesoderm and

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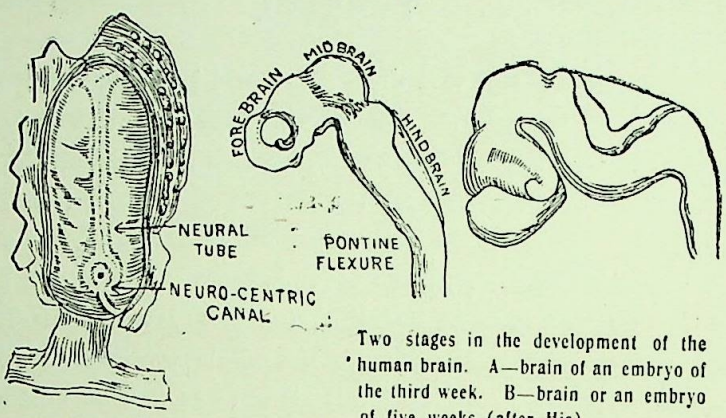
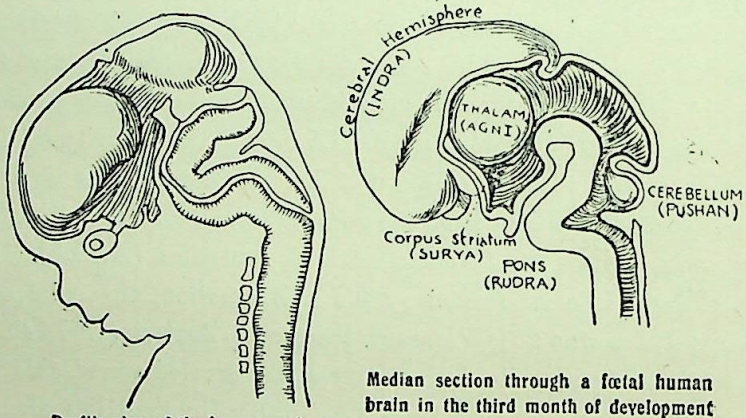
A few of the stages showing embryonic development of the nervous system.



Appearance of the neural tube

Two stages in the development of the human brain. A—brain of an embryo of the third week. B—brain or an embryo of five weeks (after His)

Fig. 3.



Profile view of the human embryo of ten weeks (after His)

Median section through a fœtal human brain in the third month of development exposing to view the cavity in which the two basal ganglia are located.

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entoderm out of which the whole structure of the human form is evolved. The activity of Tvaṣṭṛi as the ectoderm first comes into play as a primitive groove which develops into the mysterious nervous system of the body. The groove assumes the shape of a tube and is divided into upper and lower halves by means of a constriction. The lower portion, without undergoing any change in its shape, develops into the spinal cord or the earth of the Vedic world. The activity of Tvaṣṭṛi, the ectoderm, is more marked in the upper half of the tube which he uses for the creation of heaven and the gods that are located in it. By inroads of its processes like a hatchet, it so alters the shape of the tube by constrictions, bends, enlargements and balloonings, that it causes the upper half of the tube to form the wide expanse of the brain—the heaven of the Vedic world—enclosing in it the original cavity which, keeping pace with the development, assumes the shape of the sacrificial cup—the ventricular cavity—to hold the beverage of the gods. As development proceeds, this cavity is divided into four by the arrangements of the nerve-fibres (Ṛibhus) which proceed upwards from the spinal cord towards the surface of the brain, thus forming the four ventricular cavities or cups inside the brain. In these cavities are located all the gods who have their abodes in heaven as projections in the form of nerve-centres. Even Agni and Sûrya, as the chief subsidiary sensory and motor centres are products of his activity and are located as projections in these cavities. By further development of nerve-fibres shapes of animals and men are made to move in the Vedic world. The bolt of Indra, which Tvaṣṭṛi is said to have shaped with his axe is the collection of afferent and efferent nerve-fibres connecting the spinal cord and the brain and compressed into two thick bundles which support the vault of heaven. Tvaṣṭṛi or the ectoderm is thus the creator of the Vedic world. It is the embodied abstract form of the One-All, who is the source of all creation. It manifests itself in grosser form in human beings as the nervous system, i. e., the universe with us.

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THE ṚIBHUS.

In the middle realm of the atmosphere, various divinities of wind and storm are supposed to live. These are supposed to be the Genii of the Seasons, i. e. the Ṛibhus. They are said to be the sons of Sudhanvan, the Good Archer. They are also spoken of as children of Manu, the regulator and law-giver. This probably refers to the spinal cord which conducts impulses between the brain and the organs of sense and action. The spinal cord at its upper end, where it joins the hemispheres of the brain, enlarges into a truncated cone and forms the medulla oblongata or the bulb of the cerebro-spinal nervous system. In this are situated the reflex vital centres which carry on their activity even when the portion of the brain above it, which controls this activity, is severed from them. The spinal cord, where it ends in the bulb, divides into three bundles of fibres on each side, enclosing the cavity of the fourth ventricle. These three divisions of the spinal cord proceed upwards towards the Pons (Rudra, who is called the Archer in the Ṛig-Veda) and are distributed to other parts of the brain. They are thus said to be the three sons of Sudhanvan and go by the names Ṛibhu (skilful), Vaja (stirring), and Vibhavan (artist). In these bundles of fibres a considerable rearrangement of the fibres of grey and white matter of the spinal cord takes place. The prominent bundle in the middle line forms the eldest Ṛibhu and is composed of fibres which in the spinal cord are situated principally in the lateral columns of the opposite side. They reach through the hind-brain (the Pons) to the higher conscious centres in the brain and skilfully direct all impressions to the cortical layer of the brain, the personified Indra. They are, therefore, called the sons of Indra. A smaller bundle composed of fibres on the same side of the spinal cord also passes up the higher nerve-centres along the eldest Ṛibhu and is called the Vaja. A third bundle of fibres goes to the lesser brain known as the cerebellum which is personified in the Ṛig-Veda as Pûṣan,

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These bundles are called Restiform bodies and are known as Vibhavan because they artificially keep the perfect poise of the body.

The Ṛibhus, that is the three sets of fibres, form the artisans of the Gods who transmit their desires and get them satisfied by sending impulses to the organs of sense and action. They are much devoted to their father, either Rudra (Pons) or Manu (the spinal cord), carrying out his wishes, that is impulses issuing from either of them. Owing to their devotion to their father they gain divine honours and share in the sacrifice and also in immortality. Then they begin to carry out the functions of their father independently, that is they become the reflex centres in the medulla which forms the object of worship. The eldest of the Ṛibhus acts as the horse of Indra, consciousness deified, and the others form the carriage.

In embryonic life the nervous system is created by the ectoderm (Tvaṣṭṛi), one of the three layers of cells formed in the evolutionary stage of the fertilised ovum, Hiraṇyagarbha, like a tube enclosing a single cavity. This tube, by subsequent changes in its own wall and by growth of the nerve-fibres, undergoes many changes to suit the requirements of fœtal life. The shape of the tube at its upper end where it develops into the brain is so altered by peculiar twists and bendings of growing never-fibres that it divides into four separate cavities in the brain and forms the four ventricular cavities. These sons of Sudhanvan thus become rivals to Tvaṣṭṛi in that the latter prepares one cup (hollow tube) for the gods to drink water, but the Ṛibhus, by their skill in arranging the fibres, prepare four out of the one cup. The resting of the Ṛibhus after many wanderings in the house of Agastya is suggestive of their development during the nine months of fœtal life and three months of child-life. There they merge into the chief conscious subsidiary nerve-centres in the brain, known as the corpus striatum, and, after resting there for twelve days, new offshoots proceed downwards from this subsidiary nerve-centre to join the portion of the neural tube from which they proceed.

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SAVITṚI

As an agent of the One-All, Savitṛi is identified with the great quickener of the world, the Sun. His abstract character as given in the Ṛig-Veda is thus somewhat obscured. The rising of the Sun on the horizon sets the earthly regions of the Ṛig-Vedic world in motion while the Sun himself is activated by the god Savitṛi. He existed even before the Sun. But for him the Sun would never have shone and the earth would never have been stirred to activity. He is both abstract and concrete in his personification. This led Sâyaṇa to put forth his theory that the god Savitṛi is called Sûrya as long as he is visible on the horizon, but when he is invisible, i. e. below the horizon, he takes the title of Savitṛi. Some identify Savitṛi in his abstract form with the rays of the Sun. Kaegi takes Sûrya to represent the Sun-body and Savitṛi the divine power behind it. Some have identified Savitṛi with Sûrya as, like the latter, he illumines every nook and corner of the world (I.13.5,7 ; IV.14.2; V.81.2). His golden arm he stretches aloft to the heaven and downwards to the end of the earth (II.38.2 ; IV.53.3,4; VI.7.4,5). He moves in a golden car regarding all creatures in the Vedic world on a downward and upward path (I.35.2,3). Borne by swift steeds, he is said to unyoke his car and bring the fleet chariot to rest as well as the agile horses that carry him. He shines after the dawn (V.81.2), but he drives the car of the Aśvins even before the dawn (I.34.10). After measuring the earthly spaces, the yellow-haired Savitṛi transfers his imperceptible energy from the front or the east (X.139.1) to the bright realms of heaven, and there it merges with the rays of the Sun (V.8.3,4). He bestows immortality on the Ṛibhus who rise to his abode by the greatness of their deeds. He observes fixed laws. The waters and the wind follow his ordinances (II.38.2). Other gods follow his lead (V.81.3) and even Indra, Varuṇa, Mitra, Aryaman and Rudra cannot resist his supremacy (II.38.7,9).

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According to the biological view, Savitṛi in his abstract form, is the efferent impulse moving along the fibres of the nervous system. The god Tvaṣṭṛi, though creator of the Vedic world, has no power to quicken it. It is Savitṛi who excites the activity of this miniature universe. Even Indra, the god of wilful activity, Varuṇa and Mitra, the gods of subconscious activity, and Rudra, the god of impulsive activity, are powerless without him. They recognise his supremacy over them. All our bodily activities are dependent on the efferent segment of the central nervous system. The peculiarity about this efferent segment is that all the fibres of it do not become developed, or myelinated, at the birth of the fœtus like those of the efferent segment. It is only the spinal efferent segment which is fully developed in fœtal life and ready to discharge efferent impulses at the birth of the fœtus, as is seen in the impulsive movements of an infant as soon as he is born. The higher efferent segment is gradually developed as the infant advances in age, to carry on an efferent impulse under the goading of sensory stimuli. It is constantly educated to activity by sensations from the afferent segment of the nervous system—the Ṛibhus of the Vedic world who achieved immortality at the hands of Savitṛi by translating their desires into action. But for him the Ṛibhus would have wasted and lost their power of influencing. If we trace the course of development of efferent fibres from the point at which they are developed at the birth of the fœtus to the cortical layer of the brain, wherein the gods, as centres of motor activity are located, we find that the efferent fibres between the spinal cord and the chief motor ganglia—the corpus striatum—at the base of the brain are developed within a few months after birth, as may be seen from the response that the child gives to the stimuli from the sense-organs. As the child advances in age, the efferent connections between the spinal cord and the cortical area of the brain are established to carry out all volitional or conscious activity. These efferent fibres, as they proceed upwards, radiate in a fan-shaped manner to reach the whole concavity of the cortical area of the brain and are known as the Corona Radiata. This is the god Savitṛi in his concrete form. (See Fig. IV).

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The radiating fibres are described in the Vedas as the yellow hair of Savitṛi. They also form his arm which Savitṛi extends upwards to heaven (the brain) ; on their downward path the efferent fibres extend as the arms of Savitṛi to the end of the earth (the spinal cord). Savitṛi's sweeping his arm upward and downward points to the extent of the efferent fibres, while Savitṛi's carrying his imperceptible energy from the east to the bright realm of heaven to merge with the rays of the sun shows the location in the central nervous system of the efferent fibres which are bundled up with the efferent fibres of the corpus striatum like the rays of the sun on raised surfaces, known as pyramids which are located on the anterior or east surface of the spinal cord. His shining after the dawn suggests that his development is later than that of the efferent fibres of the corpus striatum which causes the early feeling of consciousness like the dawn in human existence. The impelling of the Aśvins' car by Savitṛi even before the dawn points to the fact that the lower efferent fibres of the spinal cord below the pyramids (the car of the Aśvins) are active enough to start an impulsive movement even earlier than the efferent fibres of the corpus striatum which are concerned in the dawning sensory-motor activity of childhood.

The efferent segment in the brain, being educated to send impulses, is under the control of the will and, though the impulse along them moves quickly as Savitṛi on the swift steed, yet Savitṛi is said to unyoke his car to bring the fleet chariot of the efferent fibres to rest or to empty them of impulse. Savitṛi is thus a god with a will which he uses for the benefit of mankind by not allowing the efferent impulses to move and so preventing any movement detrimental to human existence.

The purely automatic activity of an infant, the dawning sensory -motor activity of childhood and the purposive or ideational activity of adulthood are all dependent on the god Savitṛi, who moves in an abstract from as an impulse over the efferent fibres—his concrete form. He carries out these activities according to fixed laws and ordinances. He is, therefore, the quickener of the Ṛig-Vedic World.

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THE AŚVINS.

The Aśvins are next to Indra, Soma and Agni, the most celebrated deities of the Ṛig-Veda. They are the divinities of light glowing in the heavens. They have the most pronouncedly mythical and legendary characters of all gods in the Vedic pantheon. They go in pairs as twins and pervade every part of the Vedic World. They are said to come from above, below, behind and before (VIII.8.34). It is said that the Aśvins from the far-off region gather together as twin sons of Vivasvat (X.7.1) whose location is in the Nâbhi (centre) of the Vedic World (I.139.1), i. e., at the junction of heaven and earth. They are even said to dwell with Vivasvat (I.46.13). Some of the seers have also seen them located in the floods of heaven (VIII.26.17). The most important characteristics of the Aśvins is that their skin is filled with honey (IV.45.3). They ride a peculiarly constructed car, which has three seats and three wheels and which was wrought for them by the Ṛibhus (X.139.12). The car has the swiftness of thought (I.118.2) or the twinkling of the eye (VIII.6.2). It is drawn by horses (I.117.2) or by birds (VI.66.3) or by swans (IV.45.4). It is also sometimes described as drawn by buffaloes (I.184.3) or by an ass (I.34.9). It is a huge car which touches the ends of heaven and extends over the five regions of the Ṛig-Vedic world (VII.63.2,3). One of the wheels of the Aśvins' car is lost on the way when they start to win Sûryâ, the fair daughter of Sûrya. The twins are visible in the early part of the dawn while darkness still stands among the ruddy cows (X.61.4). There exists an interrelation with Uṣas and the Aśvins, for Uṣas is said to awaken them (VIII.9.17). They follow after Uṣas in their car (VIII.5.2). Uṣas is born at the yoking of the Aśvins' car. Apart from this physical description of the Aśvins and their equipment, they have other qualities. They are said to be agile (VI.63.5), fleet as thought (VIII.22.6), dexterous, saviours of mankind, divine phy-

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ASVINS.

Transverse section through the Brain in the direction of Medulla Oblongata showing the course of Pyramidal tracts, (Asvins) upwards & downwards. The left half of the diagram shows fully developed nerve fibres in an adult. The right half shows the undeveloped fibres in the brain of a child.

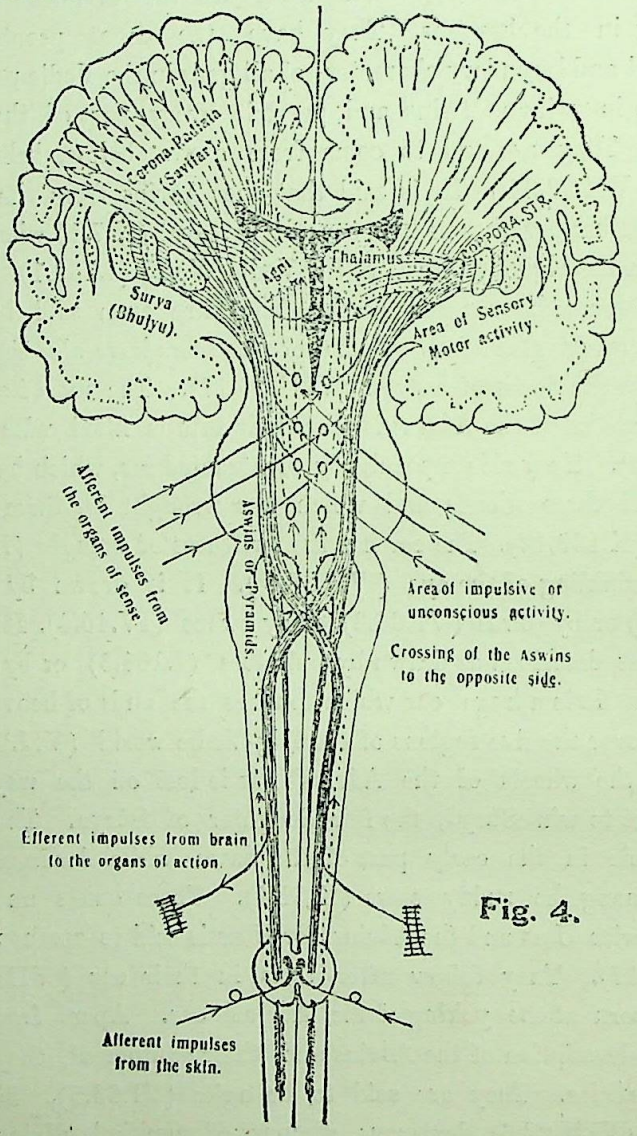

Fig. 4.

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sicians (VIII.18.8); to be ancient (VII.62.7), young (VII.67.10) and lustrous (VII.68.1). They possess many forms (I.117.9) and wear lotus garlands (X.184.4). They cure the blind, the sick, the maimed (X.39.3) with their remedies (VIII.23.10). Indeed, so many and such different things are said about the Aśvins, that commentators have been puzzled to determine their essential nature. Their physical characteristics and their attributes are certainly confusing. No two commentators or Vedic research scholars agree as to their interpretation. To some they are "heaven and earth"; others identify them with "night and day"; they are even said to be "the Sun and the Moon". Writers of legends regard the two Aśvins as two pious kings ever engaged in the performance of holy acts. According to Yâska, the oldest interpreter of the Vedic gods, they represent the transition from darkness to light, when the intermingling of both produces that inseparable duality expressed by the twin nature of these deities. Though Yâska's interpretation of the Aśvins from their behaviour as natural phenomena is more probable, yet it ignores the physical delineation which, I believe, is not mere imagery of Vedic seers. No existing speculations about the A vins have explained this delineation and only a biological interpretation of the Vedic gods can explain its anthropomorphism.

According to the biological view, the Aśvins, from the fact of their convergence from all points at the Nâbhi of the Vedic world to form the twins of Vivasvat, appear to be the projections of efferent fibres on the interior surface of the medulla oblongata. The efferent fibres, starting from the cortex of the brain (heaven) pass through the substance of the brain, its peduncles and pons to converge and become two separate bundles. They manifest themselves as two projections, known as pyramids, on the anterior surface of the medulla which is personified as Vivasvat. In the lower part of the medulla these efferent fibres cross each other to form the cross-pyramidal tracts of the spinal cord and extend over its whole length. These efferent fibres extend from the cortex of the brain (heaven) and, spreading over all the divisions of the

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spinal cord (earth), form the car of the Aśvins which is set in motion by the Ṛibhus, the afferent system of the Vedic world. The horses that drive the car of the Aśvins are the impulses moving along the nerve-fibres which are surrounded with a soft jelly-like structure, wherefrom the Aśvins are said to carry honey in their skin. This is the medullary sheath of the nerve-fibres, and no nerve tract functions until all the fibres composing it have medulated to their terminations. It seems, therefore, that the Vedic seers had a knowledge of the medullation or myelination of the nerve-fibres when they talk of the Aśvins carrying honey in their skin.

With the birth of the fœtus only does the whole of the afferent system as well as the efferent one in the spinal cord become fully developed to carry impulses. The efferent portion is brought into functional activity by the afferent impulses caused by the maternal parts on the integuments of the fœtus in the uterine activity. The upper portion of these efferent tracts which reach the cortical layer of the brain are only actuated after birth by the constant goading from the afferent impulses of the nerve-centres connected with them. This development of the efferent impulses is dependent on force of habit and it takes about two years to educate these centres to carry efferent impulses for the execution of all voluntary movements. This is the period when the Aśvins are trying, by forming connections between them, to help the various dormant nerve-centres in the interior of the brain, pons, and medulla to attain full functional activity. They are, therefore, styled physicians of the gods.

For about three days and three nights after birth an infant remains in the early twilight condition when his organs of sense, though fully developed to receive afferent impulses, are not yet accustomed to their new surroundings and any muscular activity of the infant, however purposive it may appear to be, is not stimulated by sensory afferent impulses but by the overflow of nervous energy along the fully developed efferent tracts in the spinal cord. These movements are, in fact, purely impulsive or automatic and the child is entirely unconscious of them. Later on, as the child advances

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in age, his external organs of sense begin to receive afferent impulses from without which excite the nerve-centres to discharge efferent impulses to the musculature of the organ. The first nerve-centre to be thus stimulated is the visual centre. This forms the starting-point of the dawn on the horizon of the Vedic world. The child begins to execute movements in response to the sensation which he receives but of which he is still unconscious. This establishment of efferent connections with the centres of organs of sense is the yoking of the Aśvins' car which causes Uṣas to be born. The Aśvins according to the same explanation can be properly called the harbingers of dawn when the individual centres of the organs of sense are fully habituated to receive and discharge impulses. The Aśvins ascend to form connections between higher nerve-centres, for the functional activity of the Aśvins travels from below upwards in the miniature world, i.e., from the medulla oblongata, the upper end of the spinal cord, towards the cortical layer of the brain above it. Whether the development of efferent fibres occurs from below upwards to the cortical layer of the brain or from above downwards towards the spinal cord is still a debatable question but the present physiologists are inclined to hold the latter view.

After exciting the dawn—a task which lasts about 4 to 6 months—the Aśvins go in search of the Sun—the early conscious mechanism of childhood—forming efferent connections between the chief motor centre, the corpus striatum, and through it, to the organs of action. When these connections are established, the child gains a consciousness of his surroundings and responds to afferent impluses from within and without the body. This is manifested by the various activities of the child—directing its eyes or face towards the quarter from which sound emanates; laughing when tickled, making a gutteral noise when addressed, and crying when hungry. This receiving and sending of afferent and efferent impulses from the sensory and motor centres located above the medulla oblongata at the base of the brain forms the earliest phase of consciousness in life. This is the sunrise upon the universe within. The Sun of Consciousness which was hidden is thus made to shine by the Aśvins,

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Before the corpus striatum was stimulated by afferent impulses, it was sending out efferent impulses by the pressure exerted by the ventricular fluid (Soma, Sûryâ's wooer), but was unable to form any afferent connections.

The formation of efferent connections by the Aśvins with the corpus striatum, the chief motor ganglion, is woven into the legend of the Aśvins and Sûryâ as given in the Ṛig-Veda. The Aśvins, desirous of winning Sûryâ, the fair daughter of Sûrya, yoked their horses (impulses) to their car, the efferent nerve-fibres. Sûryâ then ascends their car, i.e., she establishes connection with the nerve-fibres. While proceeding to win Sûryâ, the Aśvins lose their lowest wheel of the car. Now, Sûryâ is the motor basal ganglion which governs the voluntary actions in childhood and is evolved from the upper part of the embryonic neural tube as a swelling before it expands to form the hemispheres of the brain. It is therefore called the daughter of Sûrya, the epithet of Indra (the brain). In the central nervous system the incoming or afferent impulses terminate at three levels to produce reflex efferent impulses. The first reflex movement is started by afferent fibres establishing connections with the efferent one through a centre in the spinal cord. This is the lowest wheel of the Aśvins' car which disappeared when they started to win Sûryâ. The second wheel is formed by the connections of afferent fibres with the chief sensory ganglion, by stimulation of which the reflex movement along the efferent fibres is induced. The connections of afferent fibres with the cortical layer of the brain excite the efferent fibres from it to carry impulses to the musculature of the body. This is the third wheel of the Car of the Aśvins. There is a very close similarity between the three wheels of Aśvins and the three strides of Viṣṇu. In fact, they are practically identical.

Indra, the highest god in heaven, had to invoke the aid of the Aśvins in his fight with Vṛitra. The Aśvins were able to help him by abstaining from carrying impulses to the organs of action. Indra is thus left free to fight his battle with the demon of unconscious activity and to subdue him by establishing constant efferent

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connections. The A vins, are, therefore, associated with Indra as Vṛitrahan. They are also credited with the qualities of the Maruts, the cerebral nerves which with afferent fibres also carry efferent fibres to the muscles of the organs of sense.

The lower conscious centres in the brain prove to be inefficient to carry on all the complex activities of the body, including thoughts, emotions and memory, as childhood passes into boyhood and eventually to manhood. The consciousness is, therefore, extended over a wider area on the surface of the brain by the afferent impulses issuing from the centres located below it. Then the Sun of Consciousness as Indra, shines in all its glory in the cortical area of the brain.

This description of the powers of the Aśvins and the help they render to their portégé by rejuvenating, curing and rescuing a number of decrepit, lame, blind or oppressed (i.e. undeveloped nerve-centres) is suggestive of our modern knowledge that the lowermost centres of vital activity begin to function through the afferent impulses as soon as the fœtus is born; but the higher centres, which are lying dormant and which are concerned with the awakening of thought, emotions, reasoning, judgment and memory, begin to develop and function in an ascending order through the afferent impulses only as the child grows to manhood.

There are a number of curious yet interesting legends about the Aśvins given by different Ṛig-Vedic seers. At the first glance they seem to be of an imaginary character. Vedic scholars have only been able to give a significance to these legends by allowing free play to their imagination in propounding the Dawn, the Storm-cloud, Vernal and Sun theories about their existence. These theories have been proved quite inadequate to explain fully all the details connected with the legends.

The Arctic theory of Tilak, who tries to elucidate the significance of all the points connected with the Aśvins, is also too laboured and ingenious to be accepted by scholars without hesitation. At the outset he presupposes that the polar regions had an equable climate and were habitable in the interglacial periods, and he justifies his assumption by reference to geological data. His

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second assumption is that the waters mentioned in the Vedas are not actual waters but watery vapours moving in the space above the earth. It is a debatable point whether the polar regions were habitable in Vedic times. Even granting this, to believe that the subtle matter which filled the whole space in the universe was a watery vapour which caused the sun, the moon, and other heavenly bodies to move is to allow oneself to be imposed on by the subtle ingenuity of the scholastic imagination. The whole thesis of Tilak is based upon this rather bold assumption regarding the cosmic waters, which serves to explain some of the Vedic myths, and the clue to this, according to Tilak, is to be found in the Indra-Vṛitra legend. Indra's victory over Vṛitra symbolises the release of these waters from the clutches of Vṛitra and their upward flow again to join the ærial ocean to release the sun and the dawn from their confinement. But whether Vṛitra is to be interpreted cosmologically or biologically is a question which must be first considered. Tilak's theory albeit scholarly, does not adequately explain the natural phenomena we see all round us. If we take Tilak at his word and prove that his assumption that the Arctic regions were habitable in Vedic times is absoultely unwarranted, his whole story falls to the ground. If we take all that is mentioned in the Vedas being true at all times, we are in a position to cut the ground from under the feet of the Arctic Theory. There is nothing in the Vedas themselves to suggest that the waters mean watery vapours and Tilak has to depend on the scriptures of other nations to prove his assumption. He himself seems to be conscious of the fact that his theory is very ambiguous and, as such, not readily acceptable when he says: "This explanation of the Vṛitra legend may sound strange to many scholars but it should be borne in mind that correlation between the flow of water and the rising of the dawn and the sun, here described, is not speculative. If the Vedic works do not express it in unambiguous terms, the deficiency is fully made up by the Parsi scriptures." (P. 270).

The biological interpretation of the Vedic gods serves to explain these legends more adequately. We take nothing for

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granted. We interpret the legends by the help of physiological and embryological facts that are true at all times and in all climes. Let us explain the legends about the Aśvins on the same basis.

The sage Cyavâna, grown old and deserted, is released from his decrepitude by the Aśvins. They carry the body of the old sage as a cloak. Now in the development of the embryo, Cyavâna is the cerebellum or smaller brain which is cast off in the form of a vesicle when the upper third of the neural tube bends to form the brain. There is then a further process of enfoldment, and the vesicle that forms the cerebellum hangs, by only a partial attachment of a membrane, to the vesicle above it that forms the pons, and appears like a cloak surrounding the upper end of the spinal cord wherein are located the projections of the efferent fibres, the Aśvins. The spinal cord is elsewhere called the staff of god Pûṣan. I am inclined to believe that this sage Cyavâna is none other than this Vedic god Pûṣan. The sage is restored to useful activity by the Aśvins, the efferent nerve-fibres which develop towards it through its three peduncles. The fibres are the maidens, whose husband he is said to be. Before the development of efferent connections, Cyavâna remained an isolated part of the nervous system and received only afferent impulses through its lowermost peduncle, which is a continuation upward of a portion of the spinal cord. The formation of the connections enables him to send efferent impulses to the other gods in heaven, the nerve-centres in the brain, and is thus helpful in controlling the activity of the middle and highest physiological levels, which regulate and control the postural tone in the muscles and guide the highest centres for volitional movement. He thus becomes a useful member of the nervous system, desired by his wife, the spinal cord, to whom he clings for support.

The various other legends connected with the Aśvins can be explained in the same way by considering the formation and growth of the efferent nerve-fibres towards the various centres of reflex activity in their ascending order. In early childhood, when the

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mind is not developed enough to send efferent impulses to the organs of the body through the higher nerve-centres, the power of rousing them to activity is brought about by the afferent impulses (the Ṛibhus) through force of habit.

The legend of Bhujyu and the Aśvins (I.116) is, I believe, identical with the story of Sûryâ and the Aśvins. Sûryâ is the female offspring of Sûrya (the brain), while Bhujyu is born of Tugra, the all-powerful brain. Both are rescued by the Aśvins from the waters located in the high regions of the Vedic world. The different stories are not born of the fanciful imagination of one and the same seer. One of the Vedic seers described the efferent connections as the marriage of the Aśvins with Sûryâ, while the other described the same more in detail, as a rescue of Bhujyu by the Aśvins from the bottomless pit. The followers of these seers adopted both legends in the treatise they wrote.

Sûryâ, or Bhujyu, with his companion Rebha are the two chief ganglions, motor and sensory, situated in the upper part of the Vedic world i.e. in the fluid of the lateral ventricles of the central nervous system. In the embryo these occur as isolated projections on the internal lining of that part of the neural tube which eventually develops into the brain. The hazardous rescue of Bhujyu, who is tossed about in darkness and who is carried across to his home by the Aśvins over the boundless ocean by means of a hundred-oared water-tight ship floating in the mid air, marks the course of the efferent connections between the chief motor ganglion and the spinal cord. The ship with the above characteristics is the bundle of efferent fibres which passes through the densely packed peduncles of the brain along the posterior surface of the pons, over the fluid in the fourth ventricle—the ocean where they appear to be floating in the mid air of the Vedic world. The Aśvins, after taking this straight course, cross over to carry Bhujyu to his home, i.e., to establish connections with the efferent fibres in that half of the spinal cord which is opposite the location of Bhujyu in the upper waters of the Vedic world. The Aśvins are twins and each one of the twins is, therefore, supposed to

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carry Bhujyu (the corpus striatum) to the opposite side. They must therefore, cross each other in rescuing their protégé. This statement suggests that the Vedic seers knew of the crossing of the pyramidal of efferent fibres as they enter the spinal cord. The Aśvins achieve their end after incessant work extending over three days and three nights; this perhaps represents the time taken for the myelination of the efferent fibres so as to make them fit to carry impulses. The myelination starts even before the birth of the fœtus but the education of these fibres to carry impulses takes about the same time as the Aśvins take to help Bhujyu.

The sage Rebha, stabbed, bound and hidden by the wicked (the nerves of the organs of sense) overwhelmed by the waters for nine days and ten nights and abandoned as dead, was revived by the Aśvins and drawn out as Soma is raised with a ladle. The sage mentioned is the chief sensory ganglion, situated at the base of the brain and encircled by the fluid in the lateral ventricular cavity. The malignant who stab, bind and hide him are the afferent connections with which he became associated at the birth of the fœtus. The sudden stimulation of this sensory centre by the afferent impulses from the external world of light, noise wind and other forces, proves too powerful for it as it is not yet able to respond to their stimulus. It remains as a dead centre owing to the pressure of the ventricular fluid, the waters of which overwhelm him as Soma. According to the Vedic idea all efferent impulses in early childhood are due to the pressure exerted by the ventricular fluid on the motor ganglion. As the child advances in age the pressure within the ventricular cavity is reduced and, along with this reduction, the motor activity is induced by sensory stimulus. When these efferent connections of the sensory ganglion with the motor ganglion are established, the latter is then able to regulate the afferent impulses which tried to overpower him. The Aśvins are therefore said to revive the sage Rebha.

The sensory activity of the infant is very dull in the first few days after birth ; when the organs of sense are stimulated, there is very sluggish response. It is not till the 10th day after its birth

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that the child is able to respond reflexly to the afferent impulses. It has, however, no consciousness of this stimulation. A sudden flash of light makes the infant close its eyelids, but it is unable to regulate the mechanism of the efferent impulses so effectively as to contract the pupil in such a way as to regulate the flow of light falling on the retina.

The legends of Atri and Saptavadhri have proved a riddle to many scholars. The theories hitherto propounded have like others, failed to take account of all the details connected with them. Even Tilak, who offers a rather far-fetched explanation on the basis of the Arctic Theory combined with one of the cosmic circulations of aerial waters, takes a considerable space to expound them. He arrives at the conclusion that Saptavadhri is an epithet of Atri and that the legend connected with Atri-Saptavadhri represents the phenomenon of the setting sun in the circumpolar regions. There is nothing in the hymn itself to warrant such a suggestion. The facts connected with Atri are entirely different from the facts about Saptavadhri and are narrated in the 78th hymn of the 5th Maṇḍala. Atri, while being thrown into a burning pit during the embryonic development, invoked the aid of the Aśvins for his rescue. The pit mentioned is the cavity of the fourth ventricle, the surrounding surface of which is the area of unconscious activity enclosing the sensory centres of embryonic development which remain dormant for ten months in fœtal life. When the fœtus comes out alive and becomes fully developed after ten months, to the delight of its mother, the first to receive help from the Aśvins is Atri, the Corpora Quadrigemina, located behind the pons as four swellings which are companions to each other. This body receives afferent impulses of light without consciousness being stimulated. Atri is, therefore said to invoke the aid of the Aśvins (the efferent fibres) to rescue him from the burning abyss where he is lying dormant, scorched by the light waves. As soon as the efferent connections are established, Atri is able to ward off the glare of light by regulating the muscular mechanism of the eyes. After his own rescue, Atri requests the Aśvins to go to the aid of Saptavadhri and to deliver

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him safely out of his wooden case. Saptavadhri, as a biological conception, is the area of the seven centres of nerves which supply sensibility to the seven openings of the physical or external organs of sense. The Aśvins could achieve their end by tearing open the wooden case, the skull, as this area of the seven centres is located inside the skull. From them nerves carrying afferent and efferent fibres reach the sense organs through holes or openings in the base of the skull. For the proper functioning of these fibres (the Aśvins) the child must not only come out alive but uninjured, for any injury to these organs of sense may prevent the passage of afferent impulses to the nuclei of the nerves, and these will, therefore, not be stimulated to discharge reflex activity along the efferent fibres.

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THE MARUTS.

The Maruts of the Ṛig-Veda from their activity have been associated with the phenomena of storm and wind raging in the rainy season with their accompaniments of lightning and thunder. These are, however, changeable phenomena, whereas the Maruts of the Ṛig-Veda are young (I.64.2,63.2; V.42.15), and unaging (I. 164.8). Besides, in the Ṛig-Veda, they are limited in number (VIII.85.8; I.33.6) varying from thrice sixty to thrice seven. This limitation of numbers cannot be connected with the storm-winds and clouds of the external world. The Maruts, from the description given, are undoubtedly gods of stormy nature, but they are not necessarily personifications of storm-clouds. Their anthropomorphic appearance is not definitely mentioned, though they form prominent deities in the Ṛig-Veda. In the absence of a physical description, a detailed description of the ornaments and decorations they wear on their head, chest, ankles and arms is given. They are always spoken of collectively and their abode is the mid-region of the Ṛig-Vedic world and the portion above the mid-region. They have many attributes in common. They are of equal age (I.165.1), and they behave like brothers among whom none is eldest or youngest (V.99.6,60.3). They have grown up together (V.65.5). They have a common birth-place and abode. They are of one mind. They all grow in earth, air and heaven (V.55.7), and they take up their residence in the threefold division of heaven. They are youthful wooers of the Goddess Rodasî (X.78.6) who stands beside them. They have the brilliance of Agni (X.84.1; III.26.5). They are said to have kindled fire (VI.66.2). Their inherent luminosity is their special feature (I.37.2). They rise from the ocean and shed rain (I.38.9), milk and ghee (I.66.3). It has been supposed that the milk and ghee which they shed is figurative of rain but from the specific mention of rain, milk and ghee it appears that the Ṛig-Vedic seers never intended any figurative application to milk and ghee.

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They cause the heavenly pail and stream of the mountains to pour forth (I.59.7). They dispel darkness (VII.56.20), produce light (I.86.10), and prepare a path for the Sun (VIII.7.8). They are said to have measured the air (V.55.2), stretched over the terrestrial regions as well as the bright realms of heaven, and propped the two heavens, Rodasî, apart (VIII.33.9). They are frequently associated with lightning which they hold in their hands (VIII.7.25; V.54.11).

Though some of the above-mentioned specific qualities of the Maruts lead one to assume their similarity with the external storm-phenomena, there are qualities which are very difficult to reconcile with the storm, winds or clouds. This description is not sufficient to identify them as biological conceptions but when it is taken in association with their places of birth which are definitely given in the Ṛig-Veda, we can arrive very nearly at their correct biological form. The Maruts are said to be the sons of Rudra and are known as Rudriyas (I.39.47) i.e. they arise from the Pons which is personified as Rudra. They are, again, said to be the sons of Pṛiśni, the cow, which is probably the the region underneath the corpus callosum, which has the appearance of a cow. They are also said to have the ocean as their mother. The oceanic region is the fourth ventricle of the brain which is full of ventricular fluid. Collectively, these regions of birth of the Maruts are anatomically comparable to the mid-brain and the Pons in which twelve pairs of cerebral nerves have their origin. These cerebral nerves carry impressions from the organs of sense, control the musculature of the face and the organs of sense as well as their secretions. They are a group of motor, sensory motor and secretory nerves. From these, their various abodes, the Maruts spread through the airy regions towards the two heavens, the cerebral hemispheres, which appear to be standing by them as the goddess Rodasî, to be wooed by them in order that they may gain consciousness of their own activities.

This classification of the cerebral nerves is also mentioned in the Ṛig-Veda, for, though the qualities of all the Maruts are

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mentioned collectively, yet the Vedic seers have differentiated their activities according to their origin or place of birth.

The Maruts born of Pṛiśni have the qualities of fire prominently in them. These are the cerebral sensory nerves which are like fire carrying the energy of impressions from the outside world to the chief sensory centre, the Thalamus, located in the mid-brain and known as Agni. They are thus said to have kindled fire. Those arising from Rudra have a lightning-like activity in them like their father and are said to hold lightning in their hands. They regulate the facial expression and spontaneous movements of the organs of sense. They are associated with Indra, the ruler of all conscious activities. They are the allies or sons of Indra through whom we obtain consciousness of the impressions that are carried to him. They help Indra to overcome Vṛitra, the demon of unconscious activities, by surrendering to him their power of spontaneous activity. These Rudriyas are the sensory-motor cerebral nerves. The sensory fibres carry impressions from the organs of sense to the centres of these nerves and excite them to send reflexly efferent impulses like a flash of lightning along the motor fibres so as to regulate their activities. These movements do not involve any active attention from within. They are excited by the Maruts themselves on their own initiative. But, later on, this power of theirs is usurped by Indra who receives afferent impulses as impressions through them so as to gain consciousness of their working and sends efferent impulses as showers of rain to the physical organs of sense through the motor fibres of the nerves.

The Maruts born of the ocean make the earth wet with ghee, milk and honey (I.66.3; I.85.3; X.78.4). These are the secretory nerves which stimulate the secretions of the glands located in the organs of sense; this secretion is usually milky, watery and sticky. Besides these specific qualities of the separate groups of Maruts, the general qualities applicable to all are also mentioned. The peculiarity of all these Maruts or cerebral nerves is that they have a nodular swelling at their source, which forms their golden helmet from

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which branches of different lengths issue forth as spears. They end in the sympathetic ganglia of the organs of sense which form their anklet, and their arborising with them becomes their clasping. These nerves are like brothers who come into activity simultaneously and are therefore equal in age. They carry on their work with unabated vigour and are therefore unaging. They are of one mind, as the task of every nerve is to carry afferent impressions to the cerebral cortex, Indra, so as to excite consciousness of their working. These Maruts shine in the mountains, that is, their source is in the rugged posterior surface of the Pons. They are self-luminous as their activity is inherent in them, and in this way surpass even the lowest and highest surfaces of the brain and the spinal cord—sky, heaven and earth—since the activities of these latter are more or less educative. These cerebral nerves or Maruts create storm-clouds in the form of desires which smite the earth, i. e. the spinal cord, like lightning and produce a craving for the satisfaction of desires. This craving causes the heavenly canopy (V.53.6, 59.8) of Brahma (the brain) to tremble at the raging of the clouds and shake the tree of the voluntary nerves to send efferent impulses along them to the earthly regions for the satisfaction of desires.

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PARJANYA.

Though nothing in the world could exist without Parjanya, yet he is generally considered as a subordinate deity of the Ṛig-Veda because only three complete hymns are assigned to that deity. The number of hymns assigned to a deity, however, is no criterion of his importance, for this depends rather on the inter-dependence of the deities, no one being able to exist without the other.

Parjanya is described as a self-dependent sovereign who rules over the world in which all beings and the three heavens are established together with the triply flowing waters. He is the bull that impregnates everything, and in him is the soul that moves and stands in the Ṛig-Vedic world. The three reservoirs that pour their treasures around Parjanya are the three vats through which the Soma Juice flows when purified (VII.10.1; II.4.6). One peculiarity of this deity is his lack of initiative for he is goaded to activity by the Maruts, Vṛitra, Varuṇa and Soma to shed rain (I.38.9; IX.2.9; V.63.3,6), his most prominent characteristic. Parjanya is prayed to for showers that bring enjoyment (VII.101.5) and is implored to withhold rain after shedding it (V.83.10). As a producer of rain, he is a nourisher of vegetation (V.83.4). He is also the producer of animal fertility, for he not only places germs in plants but also in kine, mares and women (VII.102.2). He is said to quicken the earth as fire quickens the heaven (I.164. 51). This description of Parjanya might be applicable to storm-clouds gathering in the sky on rainy days, since the Maruts as storm-winds could force them to discharge their contents as rain, as suggested by European scholars, but one cannot conceive how Parjanya as personified by them could act as a producer of animal fertility. Could we infer from this that animal fertilization is intensified in the monsoon ?

A detailed physical description of Parjanya is not given in the hymns assigned to him. He is only said to be the son of

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heaven, (VII.102.2), though he is all-pervading. He not only pervades the earth and the airy region below the clouds, but he is also said to pervade the three-fold division of heaven (VII.101.2, 4, 5). By no stretch of imagination could we conceive an idea of storm-clouds discharging their contents as rain on the heaven located above them. He is the god who embraces all the three divisions of the Ṛig-Vedic world, viz. earth, sky and heaven. In this he is comparable to Indra who pervades this world. How Soma, who is supposed by the orthodox to be the personification of a shrub from which an intoxicating beverage is prepared, could have the power of stimulating the rain-clouds to discharge rain is again a question. Of the three that stimulate Parjanya to discharge its contents, Mitra and Varuṇa appear to be more powerful than the Maruts, as may be inferred from the description of their activities given in V.63. The Maruts have a restricted field of activity, stimulating Parjanya to discharge rain from the particular area over which they flow, which is the lowest division of heaven (V.60.5). Mitra and Varuṇa have a wider field of activity as they two together rule over the whole world (V.63.8). They are even said to encompass the two worlds of the Ṛig-Veda (VII.61.4). They by their power can exert their influence anywhere and force Parjanya to discharge showers of rain.

The identification of Parjanya with the storm-clouds does not explain all the points connected with him. We have to search somewhere else for the proper identification, and its exact replica may be found in the universe within. We have indentified the Maruts as cerebral nerves which supply the organs of the senses, their movements and secretions. They carry afferent impulses to their nerve-centres located in the mid-brain and behind the Pons. These afferent impulses from the organs of sense carry impressions as desires to stimulate the nerve-centres to dicharge efferent impulses as rain to the organs of action for the satisfaction of these. These reflex centres of voluntary activity have no initiative in themselves for they are goaded to activity by the Maruts and, as

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soon as the desired effect is produced, they fall dormant till they are activated again by them. The stimulus of the Maruts to excite a reflex activity sometimes proves abortive. Parjanya is then significantly shown as a barren cow. He is therefore said to dispose of his body according to his own wish (VII.10.13). Mitra and Varuṇa i.e. the cerebro-spinal fluid surrounding the whole of the nervous system, and Soma, as the cerebro-spinal fluid within it, behave like Maruts and force Parjanya to discharge rain in the form of efferent impulses. Their activity is orderly (I.23.5) and incessant (IX.22.4). The magic of Varuṇa's power is said to rest in heaven (the brain). He makes the inverted cask (the outer convex surface of the brain) pour waters in heaven, earth, air and moisten the ground. Soma, too, as it flows along the three reservoirs, behaves like stormy winds (IX.2.9) and drops of Soma, as they speed along from heaven and air towards the earth (IX.63.27), excite Parjanya to discharge his contents, for he is said to produce waters and cause heaven and earth to rain (IX.96.3). The Vedic Ṛishis have thus assigned a very important function to the cerebro-spinal fluid circulating within and around the central nervous system as an excitant of reflex activity. The variations of pressure between them perhaps have something to do with exciting the reflex activity. Varuṇa, the cerebro-spinal fluid outside the central nervous system, by exerting pressure on the cortical layer of the brain can only excite voluntary activity, as rain which may spread along the whole length of the nervous system and cause movement to occur. Soma, the cerebro-spinal fluid within the nervous system, exerts a constant rhythmic pressure on the masses of grey matter that line the cavity of the nervous system and they, as Parjanya, are stimulated to nourish and produce vegetation in the form of independent nerve-units of the autonomic nervous system which keeps up that incessant activity of the vital organs necessary for the activity and life of the body. It is this reflex activity that excites the sexual organs, causing fertility in animals. If the centres of reflex activity, Parjanya, be destroyed, a mate is incapable of generating his own species.

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Agni, the chief sensory centre, Bṛihaspati, the speech-centre, and the Âdityas, the centres concerned in all voluntary movements, behave like Parjanya and are made to discharge their contents by means of the efferent impulses to the organs over which they rule. In fact, every function in the Ṛig-Vedic World is dependent on the activity of Parjanya, whether it be voluntary or involuntary. Nothing could exist without him. He is, therefore, called the soul of everything that moves or stands in the Vedic World of the voluntary and involuntary nervous systems.

Thus, the biological interpretation of Parjanya as induced energy of reflex activity explains all the peculiar qualities of Parjanya mentioned in the Ṛig-Veda.

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UṢAS.

The hymns to Uṣas are amongst the most beautiful in the entire collection of Vedic verses. The deity to whom they are addressed is considered to be the most graceful creation of Vedic poetry, there being no more charming figure extolled in the religious lyrics of any other literature.

The deity can be definitely located from the fact that she is said to be born in the sky. She is the daughter of the sky (VII.75.1) and sister of the night (I.124.8). Her functions and physical characteristics are stated more or less definitely. This glorious Mistress of the world rides like a richly dressed dancing girl (I.92.4) in a shining chariot which is drawn by ruddy horses. She is young though ancient (I.99.10), being born again and again. Shining perpetually with a uniform hue, she wastes away the life of mortals (I.92.10). Immortal and never-aging, she is the first of the Dawn to awake before all the world, and the last to go (I.124.2). Like a wheel she revolves perpetually. She awakens creatures that have feet (IV.51.5) and makes the bird to fly up in the air (I.48.5, 10). The life and breath of all (I.49.3), she illuminates the ends of the sky when she awakes (I.92.11). As she opens the gates of heaven (I.48.15), her ruddy beams fly upwards, the ruddy cows yoke themselves and the ruddy dawns weave their web as of old. Hence Uṣas is called the "mother of kine" (IV.52.3).

From this description of the appearance and character of Uṣas it is clear that the Vedic seers grew ecstatic in trying to personify the physical phenomenon of dawn. The Vedic dawn is perpetual. As she shone in former days, so she will shine in future. She is never-aging and immortal, i.e., even after sun-rise, she does not pass away. It is evident, therefore, that this description cannot apply to the diurnal dawns of the tropical and subtropical regions, as suggested by old Vedic scholars, for these dawns are of very short duration. To account for the longer duration of the Vedic dawns

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Tilak advanced his Arctic theory. In the Arctic regions a dawn of six months is followed by a day of equal duration. But, as even Tilak admits, the Ṛig-Veda does not contain distinct references to a day and night of six months' duration; it only speaks of dawns of a very long duration. Even if we accept the theory that the Vedic seers meant to personify a dawn at the circumpolar regions, still it fails to account for the perpetuity of the dawns of which the Ṛig-Veda speaks. A break in their continuity there centainly is; it matters little that it is after a long time that the break comes. Immortal and never-aging, this dawn surely is not, neither is it of uniform hue, for the colour of the dawn changes as the sun mounts to the horizon. The colour of the early dawn cannot be the same as that of the mid-dawn or as that of the dawn near to the appearance of the sun on the horizon. Tilak admits that the Vedic dawns are unbroken and uninterrupted by sunlight, yet he also contends that the dawns mentioned in the Ṛig-Veda perish after the light of the sun breaks out.

The period which elapses between the first appearance of the dawn and the appearance of the sun is immaterial in this case; be it a day, a month or a full year. The very fact of their transitoriness is sufficient to challenge this unwarranted identification, in the light of the data furnished by the Ṛig-Veda itself. The dawn in the Vedic universe is permanent; she shines independently of the other gods and without infringing their ordinance. The path she has to traverse is previously marked out, and she seldom deviates from it. It is true that the elaborate explanation of the phenomena of the Vedic dawns as offered by Tilak in his "Arctic Home In The Vedas" accounts for many of the points connected with the description of the dawn in the Vedas ; still, it is inadequate to explain many others. I am therefore unwilling to agree with Tilak when he says that the Vedic deity, Uṣas, is no other than a circumpolar dawn invested with local attributes. The deity has baffled the intelligence of many a student of Vedic mythology, and, in spite of strenuous research has yet remained a mystery for all practical purposes. Let us try to explain it on the basis of our biological view of the Vedic gods.

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According to this theory, Uṣas makes her appearance with the first breath of the infant. The darkness ruling the fœtal life is dispersed as soon as the fœtus is born alive. This is the starting point of the dawn of the miniature Universe. The vital centre ruling the cardio-respiratory activity in human beings is located in the medulla oblongata. It is automatic in its action and has the power of sending and receiving efferent and afferent impulses along the nerve-fibres which are spontaneously yoked to it like a car on which she rides as the fœtus is born. The chariots on which Uṣas is said to ride are the fibres of the vagus nerve which is spontaneously stimulated to activity at the birth of the infant. The ruddy steeds that drive her car are two swellings, reddish in appearance, known as the jugular and petrous ganglia located at the source of the nerve. She has an existence in all vertebrates, whether biped or quadruped; like a wheel she revolves as an impulse on the afferent and efferent nerve-fibres till the close of human life. In all its stages—childhood, manhood and adolescence—her activity is constant. Never changing and aging, she may be called immortal and of uniform hue. She is the very breath of life in every human being. The appearance of this dawn in early life causes later on the Sun of Consciousness to rise. All the activities in infant life are unconscious by nature, though they may appear to be purposive. The first unconscious activity of respiration is carried on by the spontaneous stimulation of the vagal centre. It is the first to come and the last to leave. Since every breath taken shortens the period of life, she is, therefore, said to waste away the life of mortals. The period that elapses between the first appearance of Uṣas and the rise of the Sun (i.e. Consciousness) varies according to the evolutionary attainment of the child, but generally the child begins to respond to the afferent impulses when it is about 50 or 60 days old; till it is six months old the child is still not capable of sending conscious efferent impulses. Even with the rise of the Sun of Consciousness which regulates all voluntary activity, the unconscious activities still persist as the dawn, and the centre that is concerned with these activities carries

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on its eternal function independently of all the other gods. She is, therefore, said not to infringe on the ordinance of other gods such as the sun, who regulate conscious activity.

The stimulation of the vagal centre is the first stage in the process of the appearance of the dawn. The Ṛig-Veda speaks of other dawns also that are sisters to it, living at the same time without discord (IV.51.7,9; VII.76.5). These sister dawns denote the periods which elapse before the organs of sense educate themselves to respond consciously to afferent connections with the cortical layer of the brain in order to gain knowledge of the surrounding objects. Their common residence shows that the centres of these dawns too, are located in the region of the sky, i.e. in the medulla oblongata. This agrees with our modern knowledge of anatomy which tells us that the centres of the nerves supplying the organs of sense are located in the medulla oblongata. The mention of the dawn as the first harbinger of life and as extending over five regions reaching far and wide shows the extent of the nerve (vagus) on which Uṣas rides.

Uṣas is said to be made up of thirty parts (yojanas). Whether the thirty parts should be taken to mean the thirty divisions of the one dawn or thirty dawns put together to make a Vedic dawn, is a question deserving careful consideration. Here it may be briefly said that the available evidence is in favour of the latter view. These thirty dawns (the Uṣasaḥ) together form a closely collected band or group of dawns. These are the unconscious centres that rule the body before consciousness is developed. Each of these is supposed to discharge the same function as it was doing in previous lives. Sûrya, the ruler of all conscious activity, follows the Uṣasaḥ, even as a young man haunts the footsteps of a fair maiden. The Uṣasaḥ arise earlier than Sûrya and meet other gods also who desire them. All conscious centres in the brain have to invoke their aid for action. They are the unconscious force that supplies the necessary power to the other gods to gain the objects of their desire. The Uṣasaḥ are said to generate Sûrya and Agni i. e. the conscious and subconscious activities of man. Agni comes with the Uṣasaḥ, but Sûrya is generat-

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ed later. Uṣas is implored to obtain the various objects of desire. The statement that she is besought to arouse only the devout and liberal worshipper, leaving the ungodly sluggard to sleep on, is significant in that it suggests that those who are anxious to control the subconscious activities of Uṣas concentrate their attention on her, ignoring all conscious activities. On the other hand, her worshippers themselves are sometimes spoken of as awakening her instead of being awakened by her.

The interpretation by recent Vedic scholars of the lines in IV. 52.4 of the Ṛig-Veda in which this statement occurs is not adequate. One fails to explain how the dawn could be awakened by the worshipper on the basis of the theories hitherto propounded. The ruddy beams that fly aloft are the branches of the vagus nerve that go upwards to form connections between the nerves of the organs of the senses. The ruddy cows that yoke themselves to her are the various sympathetic ganglia that form connections with her. She is, therefore, called 'the mother of kine.'

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VIṢṆU.

Whether the far-striding all-pervading Viṣṇu is an important deity in the Ṛig-Veda or not is a question which is difficult to decide. If we take the statistical standard in gauging the importance of a deity, he certainly cannot rank with Indra, Soma, Agni, and the Aśvins, for he is celebrated in only five entire hymns of the Ṛig-Veda. But from the way in which he is made to traverse the earth and heaven with his strides, the way in which he supports the earth with pegs, association he forms with Indra, Soma and Pûṣan, the help he renders Indra in killing Vṛitra, I am inclined to believe that the god Viṣṇû is of equal importance with other gods whose statistical records exceed his. He is the link that establishes terrestrial connexions with the gods in heaven, as all creatures have their habitation within his three widely extended strides. He alone is the sustainer of the three-fold unity of heaven, earth and mortals. He is the ancient germ of order and he is the ordainer. He is elsewhere said to be both ancient and modern. What strikes one most while reading the hymns allotted to Viṣṇû is the absence of any account of physical characteristics. The only anthropomorphic traits which we have to base his personification on, are his frequently mentioned strides and the description of him as a youth with a vast body. He is the only god to whom the epithets of Urugâya (wide-going) and Urukrama (wide-striding) are applied. The Vedic research-scholars—Whitney, Max Müller, Kaegi and Deussen—agreeing with Aurṇavâbha, a predecessor of Yâska, take the three strides of Viṣṇu to mean the rising, culminating and setting of the sun. The strides refer, according to them, to the daily course of the sun. According to this interpretation, the third stride of Viṣṇu, which extends from the setting of the sun to his next appearance on the horizon, is in the nether world. This is at variance, however, with the mention in the Ṛig-Veda that the third step is the highest in heaven and beyond the flight of birds or mortal ken; it is regarded as identical

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with the highest place of Agni and is seen by the liberated men as an eye fixed in heaven (I.22.20). To overcome this difficulty about the third step of Viṣṇu an alternative view has been suggested by another group of Vedic scholars, Bergaigne and Macdonell, who, agreeing with Śâkpûṇi, another predecessor of Yâska, interpret the steps as the course of the sun through the three divisions of the Universe—the earth, the atmosphere and the sky. No explanation as to the arrangement of the steps however is given. In this suggestion, the step seen on the horizon marks the end of Viṣṇu's first stride crossing the earth, the stride which he must have taken during the darkness of the night and, therefore, remained invisible. From the horizon Viṣṇu, as identified with the sun, rises, culminates and declines till the setting ; this crossing of the atmospheric regions forms his second stride. His third stride ought then to begin with the setting of the sun until his next rise. It is again his first earthly stride. In the Ṛig-Veda the first stride of Viṣṇu is said to be visible while, according to this interpretation, it is invisible. Besides the sun never rises higher up so as to reach the heaven beyond the sky and become invisible. I think this interpretation of Śâkpûṇi and his followers is more confusing than the former and I am not prepared to give much credence to it unless and until a proper explanation of the arrangement of strides is furnished. I believe, it is impossible, with the spherical shape of the universe seen outside to give an adequate explanation of the three strides of Viṣṇu. It is only possible with the elongated shape of the Universe mentioned in the Ṛig-Veda.

The Arctic Theory of Tilak explains the three strides as relating to the yearly course of the sun divided into three parts in the circumpolar regions. During two of these the sun is visible above the horizon, and hence two of Viṣṇu's three strides are said to be visible ; but in the third or last part of the year, the sun passes below the horizon, producing continuous darkness. Viṣṇu's third step is thus said to be invisible. This, again, is in contravention to the statement made in the Ṛig-Veda where the third step is the highest in heaven. However, to find support for this explanation,

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Tilak takes shelter in the Pauranic myths and also quotes some stray passages from the Ṛig-Veda wherein Viṣṇu's name is associated with that of Indra. He says, on page 328 of his book "The Arctic Home In The Vedas" that the Ṛig-Veda further tells us that Viṣṇu was an intimate friend of Indra (Yajus-Śakhâ I.22.19) and that he assisted Indra in his fight with Vṛitra." There is nothing in the original to suggest this inference). Thus in IV.I8.11, we are told that "Indra about to kill Vṛitra said "O friend Viṣṇu, stride vastly" (also of VIII.12.27) and in I.156.4 Viṣṇu is said to have opened the cows' stalls with the assistance of his friend, while both Indra and Viṣṇu are described as having together vanquished Śambara, conquered the host of the Varcins and produced the sun, the dawn and the fire (VII.99.4,5). It is evident, says Tilak, from these passages that Viṣṇu was the associate of Indra in his fight with Vṛitra, and, if so, one of the three steps must be placed in the regions where the fight was fought, that is, in the nether world.

From the various verses quoted we can only infer that Viṣṇu as the friend of Indra, helped him to kill Vṛitra but not necessarily by going with him to the abode of the latter in the nether world. Viṣṇu might have helped him by removing himself away from the path which Indra took when he started to kill Vṛitra in his den. This explanation is possible if we accept the interpretation put on (IV.18.11) by Prof. Grassmann and the translators of the Siebzig Lieder. They translate the latter part of the verse thus "O Viṣṇu, step aside (or out of the way) and let me conquer Vṛitra without thy aid". Even relying on the translation of Tilak "O friend Viṣṇu, stride vastly," it does not necessarily mean that Viṣṇu helped Indra in his achievement for, in the succeeding verse (IV.18.12) Viṣṇu answers "Why dost thou ask me to help thee now; didst thou not slay thine own father ?" After such an answer Viṣṇu cannot have accompanied Indra to kill Vṛitra. It can be seen that what Tilak has quoted in support of his contention that the third step of Viṣṇu was in the nether world can be quoted against him to prove that it was not necessarily so.

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VISHNU.

Diagram showing three strides of Vishnu (indentical with three relays of sensory impulse).

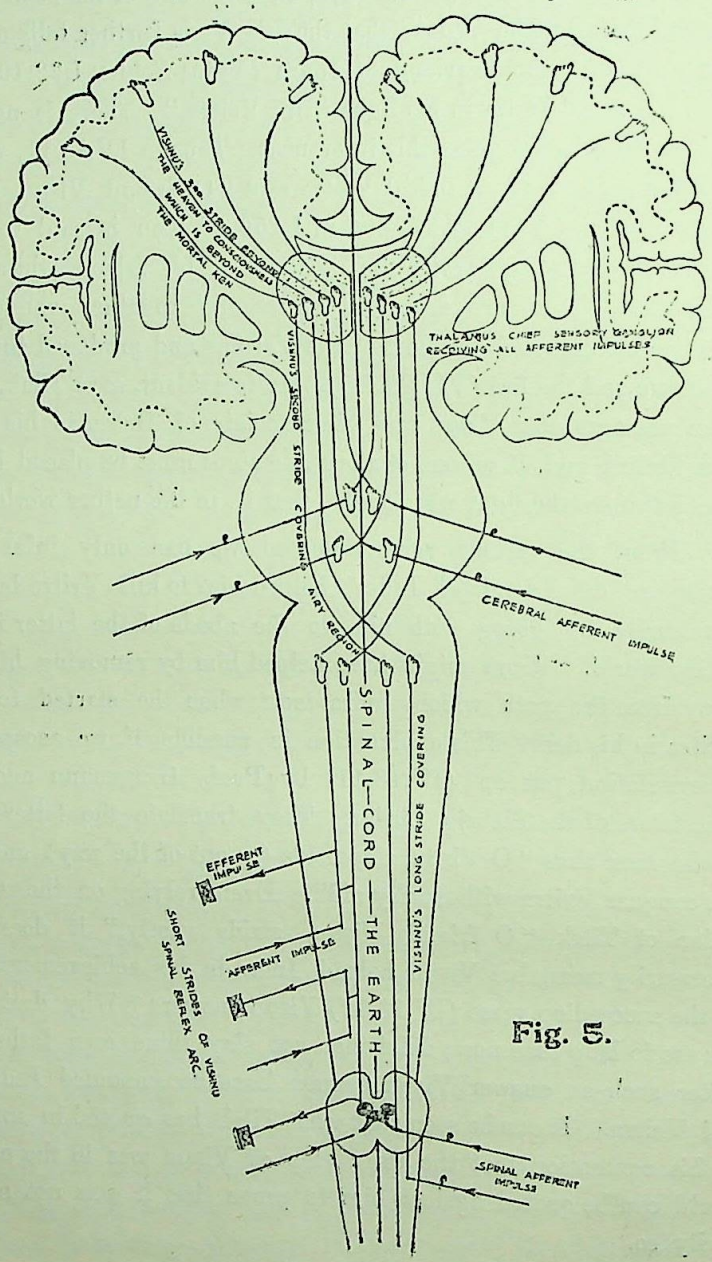

Fig. 5.

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Without taking this roundabout way of explaining the significance of the three strides of Viṣṇu, we can more easily, reasonably and satisfactorily explain this legend about him on the biological basis. Though the physical appearance of Viṣṇu is not given as a guide to arrive at a correct surmise on this basis, yet a youth, big and strong in body, supporting the earth with pegs and taking long strides that cover the earth and heaven and all that is within them is sufficient to suggest that the god Viṣṇu is comparable to the spinal cord which is long and supports the earthly matter of the body-bones and muscles &c. by means of pegs, that is, the nerves that issue from it and pass through the holes at the sides of the vertebræ, to cover and bind the whole earth together and all that is in earth and heaven.

The spinal cord is the original nervous system in every vertebrate and is the first to appear in embryonic development. It carries its function of receiving and discharging impulses in an orderly manner, and is therefore the first germ of order. It consists of a great number of nerve centres, one above the other all receiving their afferent and discharging their efferent impulses along the nerves on each side. The centres in the spinal cord are joined together by tracts of communicating fibres until, finally, the whole muscular—system the earthly material of which the body is composed—is found to be under its exclusive control. Viṣṇu is thus said to have traversed the earthly spaces in one stride (I.55.4). As soon as the fœtus is born, all impressions from outside are received by the spinal cord through the peripheral nerves at different levels. The receiving of afferent impulse by the spinal cord forms the first step of Viṣṇu. From the point where the impulse is received in the cord it is carried upwards in the central nervous system in two ways; the first variety of afferent impulse travels for a short distance and stimulates centres in the neighbourhood to discharge an efferent impulse; the second variety travels the whole length of the spinal cord above the point of entrance and ends in the medulla oblongata. The first variety of impulses, which move along the afferent projection fibres of varying lengths connecting different

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segments of the spinal cord may be identified with the strides of a dwarf and located only in the earthy region of the embodied universe. In early childhood only the lower communicating fibres are educated to receive and discharge the impulses so as to cause movement.

All the complicated combined movements executed by the child, even though they appear to be purposive muscular acts, are purely automatic and impulsive. They are controlled by the spinal cord itself. When the lower segments of the spinal cord are fully educated to act, they relegate their power to higher nerve-centres in the medulla oblongata, the topmost part of the spinal cord. These centres are reached by long communicating fibres in the spinal cord. The second class of peripheral impulses, passing along these fibres, are carried straight up to the medulla to excite an efferent impulse. This is the longest earthly stride of Viṣṇu extending from the earth nearer to the atmospheric region of the Ṛig-Vedic world where the medulla oblongata is located.

The medulla oblongata acts as an intermediary between the brain (heaven above) and the spinal cord (the earth beneath). By the time the medulla oblongata is fully educated to control the impulsive activity of childhood, the cortical area of the brain, where consciousness is said to reside, has been developed to receive impulses from the medulla by tracts of nerve fibres which have attached to them masses of grey matter. These masses are portentious developments of the afferent system and through them the fibres pass on to the brain.

The projections of the afferent fibres of the medulla oblongata upwards towards the afferent masses of grey matter (thalamus) form the second stride of Viṣṇu. This afferent mass of grey matter has its location at the base of the brain. The third stride of Viṣṇu which is loftiest in heaven and is invisible to men of ordinary ken, is, I think, the stride taken by Viṣṇu to reach the mind, which is supposed to be outside the physical body. Though the nervous system is essential for the manifestation of conscious states, one cannot legitimately infer that this susbstance produces

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those states. It is only visible to those who get fixed in heaven like an eye. By this, it is suggested that only those persons who have withdrawn their sense organs from the phenomenal world and are constantly in meditation for the realisation of the all-pervading Brahman, are able to recognize so much.

The storm of dust gathered by the footsteps of Viṣṇu is the vibratory impulse that passes from one set of afferent fibres to the other. There is no actual connection between them; the fibres of one set simply arborise with the fibres of another set. The mentioning of strides in connection with Viṣṇu leaves no room for doubt that the Vedic seers considered him as the god of conduction. I am, therefore, inclined to regard Viṣṇu as the personification of the spinal cord, which is also an organ of conduction according to our knowledge of physiology.

From the description given above, I believe that the biological theory alone explains, in a reasonable way, the significance of the strides of Viṣṇu. They are the relaying stations of the afferent impulse.

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RUDRA.

Rudra (Pons) with his braided hair, teeth and necklace round his neck.

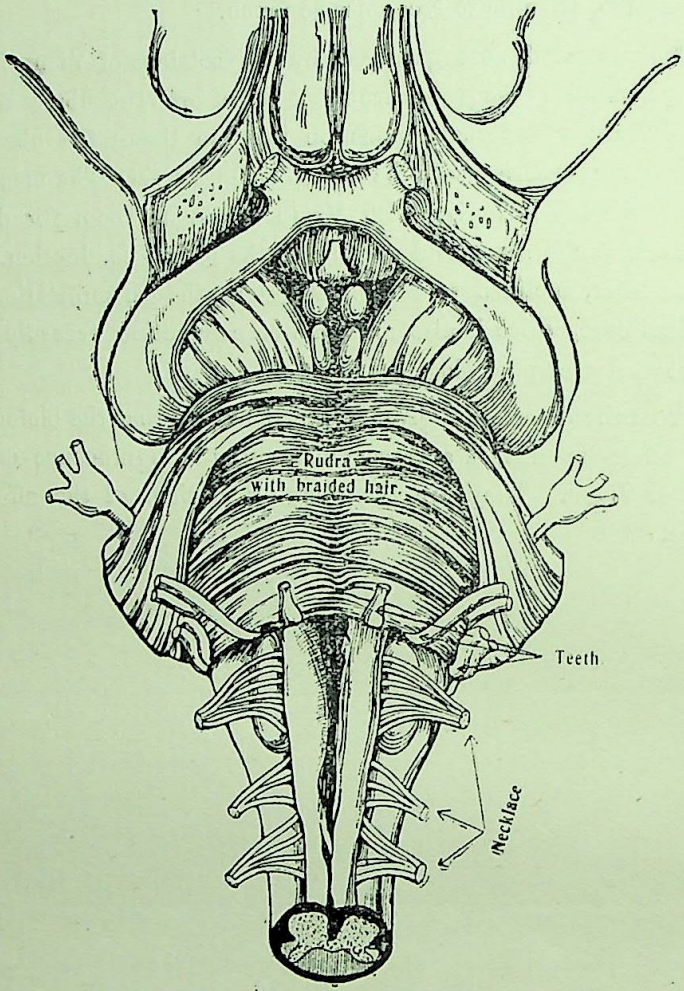

Fig. 6.

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RUDRA.

In his physical appearance as well as on account of his maleficent qualities Rudra is the most fierce, wrathful and destructive god of the Vedic pantheon. This led the Vedic scholars to associate him with the thunderstorm raging in the atmospheric region. Behind this malevolent aspect of his, there are, however, beneficent qualities which are manifested in the fertilization of the soil and purification of the germ-laden atmosphere by the rain and lightning connected with thunder. He is besought, therefore, not only to preserve from calamity but to bestow blessings and produce welfare for man and beast (I.43.6). Vedic scholars have all taken these, his abstract qualities as the basis to fix him as a personification of the storm cloud and have utterly ignored his physical features so distinctly mentioned in the Ṛig-Veda, features which give us a direct clue as to his biological nature. The Vedic seers, in their description of the gods have assigned certain physical forms to them. The Vedic scholars considered this to be a case of simple imagination or poetic fancy and have ignored the physical aspect of the gods in elucidating their personification. That the Vedic seers must have seen these gods in their concrete form impresses the mind while reading the description of their physical features, for otherwise the details given of their features could not have been so clear and distinct. I am inclined to believe that these details of their physical aspect are the true clue to the understanding of their personification.

Rudra has hands, arms and firm limbs. He is arrayed in golden arms and wears a glorious multiform necklace. His lips, too, are mentioned (II.33). He wears braided hair (I.114.1).

There is a thunderblot in his hand and his lightning shafts, discharged from the sky, traverse the earth (II.33.3). He is also seen armed with a bow and arrows which are strong and swift (VII.46.1). It is beyond belief that such a physical appearance

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could ever have been seen or imagined in a storm cloud. This appearance of Rudra is not visible in the external universe. We have to search in the inward universe for his biological form, where he is seen as a thick dense protuberance, the pons varolli, on the cerebro-spinal nervous system just above the medulla oblongata, the upper terminal end of the spinal cord (See Fig VI). The denseness of his body, as compared with other surrounding structures, gives him the appearance of the strong, (II.33.3). The numerous transverse ridges of his body have the appearance of hair parted in the middle, which is the braided hair he is said to wear. His lips are formed by a furrow at the junction of the pons and medulla oblongata. In the furrow are situated the few cerebral nerves that form his teeth. The firm limbs, which he is supposed to have, are formed by the two adjacent halves of the medulla oblongata which supports the pons and which is the thickened upper end of the spinal cord. The bow and arrows that he carries in his hand is the bow-and-arrow like spreading of the Trigeminal Nerve which issues from the side of the pons and has its nucleii in the body of it. The lightning shafts which he discharges to traverse the earth are the spontaneous efferent impulses which he generates in quick succession and with uniform energy to move along the nerve fibres that go to the organs of sense. Spontaneity is the property of the grey masses in the pons and in this quality no other god surpasses him. He is thus self-glorious, (I.20.3), exalted (VII.10.4), unassailable (VII.46.1), unsurpassed in might (II.33.10), rapid (X.92.5) and swift (I.114.4). He is ever young (II.33-1) and unaging (VI.49.-10). The spontaneous or impulsive activity which is manifested by an infant is nothing but the overflow of nervous energy through the pons. It is independent of its will and possesses scarcely any mental significance, for the nervous system of the infant is not yet educated to react to exteranl stimuli or to organic conditions. In fact, the pons is the ruling power of the nervous system at that age. As the infant advances in age, the nerve centres, which are located higher than the pons and concerned with the mental state, become active to control its purely physiological activities by formation of

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connections with them by bundles of nerve fibres that pass upwards and downwards through the Pons. That explains the statement that Rudra, by his location, looks upon the denizens of heaven and inhabitants of earth (VII.46.2), but he remains the master or ruler of the earth, the spinal cord, (II.33.9). These impulsive activities of Rudra (the pons) have gained for him the epithet of wild boar, (I.114.5) or bull, (II.33.7).

The activities of Rudra, though impulsive, have a benevolent aspect also. He is therefore called a healer, the greatest physician of physicians (II.33.4). He carries in his hands the choicest remedies for the welfare of man and beast, (I.114.5). He is, therefore, to be besought not only to preserve beings from calamity but to bestow blessings (V.51.13 ; II.33.6). The remedies which he carries in his hand are the preservative qualities of the para-sympathetic nerves which have their source in the Pons. These nerves, by their arborisations with the independent nerve units of the sympathetic ganglia, establish a controlling influence over their destructive activity. Without the beneficient influence of Rudra the various sympathetic nerve units in the body and in the organs of sense would run riot, disorganising the working of the whole body. The para-sympathetic nerves automatically exert a controlling influence over them when these exert their energy beyond a certain limit. The manifestation of their excessive energy is felt in the form of a colicky pain, a fluttering of the heart and other affections of the organs of the involuntary muscles. The pons does this work most skilfully without attracting our attention. Rudra is, therefore, called a wise and intelligent ruler, (I.43.1 ;–I.114.4).

From the foregoing description of the functioning of the pons in the body it appears that it does behave like a storm cloud to produce lightning in the form of sudden impulsive activity. The Vedic Rishis, though they retained the biological aspect, in their physical description of the gods yet described their activities in terms of the external universe. They thus tried to establish a closer relation between the external and internal universe.

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PÛṢAN.

Of all the Ṛig-Vedic gods, the personality of the god Pûṣan is most peculiar. He is represented to be very old, crooked, toothless, with braided hair like Rudra, wielding a staff with an owl perched on it. He rides a car which is drawn by goats, and not by horses as is that of Sûrya. He moves onwards, holding the Universe and takes his abode in heaven. Being the best of charioteers, he drives the wheel of Sûrya downwards. (VI.53,54,55).

In this personification, the qualities assigned to him are like those of Sûrya. This has led some scholars to identify the god Pûṣan with Sûrya ; yet there are certain specific characters which are peculiar to Pûṣan alone and are not mentioned even in the description of Indra and Soma, with whom he is lauded as a dual divinity. Pûṣan's driving the wheel of Sûrya points to the fact that he is entirely a separate entity and cannot be identified with Sûrya.

The most important function that is assigned to him in the Universe is that of a guardian and lord of roads. He is the path-finder who guides and leads the bewildered into proper paths. He is the only god to receive the epithet of "Paśupa" the protector of cattle, whom he follows and protects with his staff from falling into a pit. He is the god of prosperity and is invoked to bestow wealth and protection. His abstract qualities are thus benevolent by nature and are supposed to be associated with agriculture. He has, therefore, been considered to be a pastoral deity. He is termed "devotion-stimulating" and the owl on his staff is believed to be "prayer-instigating". He carries his worshippers along the proper road to the place where the righteous have gone.

There has been much controversy about the anthropomorphic character of Pûṣan, for his qualities, both abstract and material, are so peculiar that speculation has offered no explanation for them. Yet his physical characteristics are given very definitely and these alone will help us to form a correct estimate about his personification.

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The birth of Pûṣan on the far-off path of heaven and earth (VI.17.6) is suggestive of that portion of the nervous system which is known as the cerebellum, the smaller brain. By the process of enfoldment of the upper part of the neural tube of embryonic life, the cerebellum hangs down as a separate entity, away from the fully developed cerebro-spinal nervous system, the far off path, but remains attached to it by means of peduncles, which form the goats of his car—the bundles of nerve fibres that carry impulses to and fro, from the nervous system. From this—his peculiar position—he is said to watch the heaven (the brain) and earth (the spinal cord). The staff which Pûṣan wields is the spinal cord, which is encircled by his peduncles. The owl that is perched on the staff represents the owl like appearance of the posterior surface of the medulla oblongata and the quadrigeminate bodies. The qualities of Pûṣan as a road-maker, a guardian of every path, a guide, a protector and deliverer of cattle (I.42.1,3.VI.53.1) are suggestive of the functions of the cerebellum. In a fully developed being, the god Pûṣan is the great centre for co-ordination of muscular movements which keeps the body in a position of equilibrium. It is the balancing centre of the body, which controls the antagonistic muscles of the body and limbs in such a way as to keep the body erect. Without proper balance, even the most rudimentary manifestation of life —the power of locomotion—is impossible. Further in the progress of evolution, the animal being has to realise the exact position of his limbs in relation to his body and environment. This adjustment of limbs to a particular position is dependent on the sensation that arises in the muscle itself. It is the internal impulse that adjusts the limbs in relation to the body; the body and limbs adjust themselves in relation to space, having to depend on impulses from the physical organs of senses. These impulses are sensory, auditory, visual and olfactory. All these efferent impulses from within and without the body converge on the cerebellum as travellers on roads formed by the nerve fibres. Knowing the desire of these travellers, the cerebellum reflexly sends efferent impulses to the motor area of the brain (Indra), with whom god Pûṣan is

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PUSHAN.

Pushan (cerebellum) hanging as a cloak on his staff with an owl perched on it.

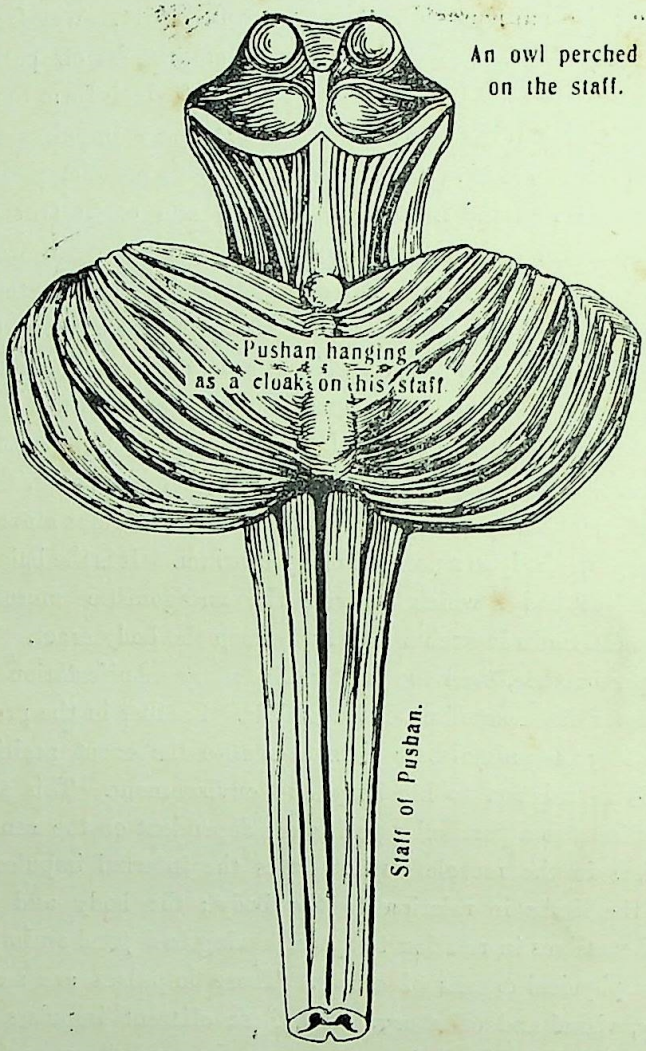

Fig. 7.

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associated as a dual divinity, so as to stimulate the appropriate centres of that area and to discharge the energy along the proper roads or nerve paths to particular muscles to gain the manifestation of their desire.

Thus all our complex bodily movements are regulated by the god Pûṣan, as the reflex centre of co-ordinated muscular activity. He is the god who finds the proper paths, governs the roads and guides the travellers along the roads to their proper destination. In the absence of this god, the cortical motor area of the brain would be irregularly stimulated to discharge energy to the groups of muscles not concerned in proper co-ordination. The result would be the loss of balance, which is experimentally seen when the cerebellum is detached from the nervous system or when it is pathologically affected.

The wheel of Sûrya, which Pûṣan as the best of charioteers is said to drive down, is the unconscious balance of the body which is effected by the stimulation of the reflex centres in the cerebellum by the afferent impulses passing to it through the chief subsidiary motor ganglion, the corpus striatum, known as Sûrya. The efferent impulses generated by the cerebellum pass for their proper co-ordination down the spinal cord to the muscles of the trunk or limbs. In this case, the afferent impulses do not reach the conscious centres in the cortical layer of the brain.

Besides this function of keeping the body poised in space round the centre of gravity, another important function is assigned to the god Pûṣan in Vedic literature. It is the function of controlling and regulating the unconscious internal activities of the body. Our present knowledge of physiology concerning this function of the cerebellum is still in its infancy, as nothing definitely is known about the other functions with which Pûṣan is associated. The Ṛig-Veda is definite about the controlling influence it exerts on the katabolic activities of the sympathetic portion of the autonomic nervous system, which is not under our conscious control. The preservation by Pûṣan of the cattle—the sympathetic nerve units—from injury by falling into a pit, and the bringing of them home unhurt is suggestive of the idea that these nerve units, if left

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uncontrolled, would excite a destructive activity of the organs composed of involuntary muscles so as to endanger the life of the animal being. This katabolic activity is controlled by Pûṣan with the help of his staff by which controlling connections are formed with the various sympathetic ganglia situated laterally and centrally. It seems that the cerebellum is also a great centre for the reflex control and regulation, through its parasympathetic fibres, of the sympathetic activities of the autonomic nervous system.

The legends about Pûṣan, that he is the 'wooer of his mother' (VI.55.5) and 'a lover of his sister' may be explained by the fact that he remains attached to, and in constant association with the upper part of the neutral tube of embryonic life which ultimately develops into the brain and from which it is developed. As a lover of his sister, he is in constant attachment to and communication with the basal motor ganglia which are developed as protuberances with Pûṣan inside the neural tube in embryonic life.

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SÛRYA.

It is impossible to say how often the name of Sûrya occurs in the Ṛig-Veda. It is sometimes mentioned in connection with the natural phenomena that are associated with him. Occasionally, his name designates the orb of the luminary. It must be mentioned here that the Sun-god of the Ṛig-Veda holds a dependent and subordinate position as compared with certain other gods. He is not the all-dominating luminary that we see in the sky, as he is said to be god-born. Indra is said to have generated him in association with other gods and to have caused him to shine and to have raised him to heaven. Though Sûrya is roused to activity by the agency of other gods, yet, when he reaches his full brightness, he shines for all and lives for the comfort of all the world-men and gods. He is the intermediary through whom other gods manifest their powers.

Sûrya, is the chief subsidiary motor centre in men, is situated in the mid-brain (mid heaven) and is stimulated to activity by efferent impulses from the cortical layer of the brain (Indra) to translate his desires into action. The seven horses that drive his car are the efferent nerve fibres that issue from the chief motor centre to the special organs of the senses. Sûrya unyoking his car in the mid-heaven is suggestive of the idea that early infantile activity is wholly controlled by him, as no efferent connections are yet developed between Sûrya and Indra giving conscious control over the impulsive activity of Sûrya. His halting place is the mid-heaven and there he is constantly forced to yoke and unyoke his horses, that is to say all afferent impulses are yoked to receive and unyoked to discharge through that centre alone. Sûrya is thus said to move to and fro. This to-and-fro activitity of Sûrya is said to be due to the rhythmic pressure exerted by Varuṇa, the cerebro-spinal fluid outside the nervous system. The mention of this swinging movement of the Sun-god in the midst of heaven led Tilak to believe that the day of the Vedic bards must have been a long-continuing one,

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as is seen in the Arctic regions, where the sun appears to swing on the horizon for a number of days of twenty-four hours before he disappears below the horizon to cause a night of equally long duration. The Vedic bards have permenantly located Sûrya in the mid-heaven where he is said to be visible all the time. It is true that Sûrya of the Ṛig-Veda lost his lustre when Indra usurped his powers but he was not dislodged from his position. He, therefore, cannot disappear from view to cause days and nights. The long halt of Sûrya in the mid-heaven does not necessarily mean a halt of a few months; it may be even of many years or even of a life time. No certain duration of this halt is mentioned in the Ṛig-Veda.

According to the biological theory, Sûrya is the motor basal ganglion of the brain, which controls all infantile motor movements, however purposive they may appear to be. This is the first appearance of the Sun on the horizon of the embodied universe after the dawn of respiratory activity. This condition of impulsive infantile activity may last for 6 or 9 months of earthly life ; but, later on, the complex-activities, to which the infant takes when it grows to childhood and adulthood, prove too much for the basal ganglion to control. They are then taken over by the cortical layer of the brain (Indra). The early conscious reflex arc is located in the mid-brain between the two basal ganglia, the corpus striatum (Sûrya) and thalamus (Agni). These two centres between them carry on the sensory motor activities of childhood. This reflex arc between the two, forms the wheel of Sûrya which has seven spokes, the nerves that issue from it to the organs of sense. Indra is said to have stolen this wheel at the completion of ten months. This stealing of the wheel by Indra means that the uncontrolled activities carried on by the wheel of Sûrya were controlled by Indra by establishing efferent connection with the organs of sense and action as may be seen by the cautious way a child takes his first steps. At the completion of ten months the seed of the will sprouts and it can be said then that the first conscious reflex arc is established. Indra is, therefore, correctly described (IV.17.24) as having stopped the wheel of Sûrya and flung it into the nether world of darkness *i. e.* into the

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region of the brain which is not concerned with conscious activities.

We have seen, in the Indra-Vṛtra legend, that Indra is the sole hero who recovers the Sun and the dawn. The recovery of these two shows that they had a former existence before they were conquered by Indra, who usurped all their initiative of impulsive movements, but that they were never dislodged from their position. The initiative which Sûrya had in early childhood was again restored to him by Indra after a boisterous existence of 40 years, a period when a man completes his Gṛihasthâśram to enter into Vânaprasthâśram in which he begins to take the introspective view of life. The characteristic of the Ṛig-Vedic Sun, therefore, is that it never disappears below the horizon when once it has risen above it. It is true that its light gets dim but it never sets so as to cause the darkness of night and as such it cannot, therefore, be associated with the day nor can his ten horses (the organs of sense and action) be taken to mean months as suggested by Lokamanya Tilak.

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AGNI.

The majority of the Vedic hymns are written in praise of Agni and Indra, the two most important gods of the Vedic pantheon, Though they differ in their activities, yet they are inter-dependent. Indra is the more volitional and wilful god who subjugates the other gods that existed before him, while Agni is more instinctive and uncontrollable, and carries on his destined activities for the good of gods and human beings, without reference to the will of Indra. Vedic scholars regard these two gods in their cosmic relation as personifications of fire and the firmanent.

The location, birth, activity and attributes of Agni as a divinity are so varied and contradictory that the description of him by Vedic seers appears as chaotic as the description of Soma. The numeral "three" seems to be a favourite one with this god of smouldering activity. He has a three-fold birth (I.95.3) and three-fold light (III.6.7). He has three heads (I.46.1), three tongues, three bodies, and three stations (III.20.2). He is the only god spoken of as "Dvijanman," the twice born (I.60.1; 140.2). According to his location, he receives three epithets. In heaven, he emanates from his own body as 'Tanû-napât' and from his activity in the mother's womb he is also styled, as Mâtariśvan (III.29.11). In the mid-region, he is generated by water as Apâm-napât. On the earth, he belongs to all men and exists as Vaiśvânara, to whom all sacrificial oblations of food, ghee, milk and honey are offered. Collectively, Agni is called Jâtvedas—one born with the knowledge of the past or one born with the knowledge of the functions he has to carry out in the universe.

The birth of heavenly Agni, though variously described by Vedic seers yet in the main in agreement with each other, is that he is the product of two, either of Dyaûs and Pṛthivî (III 2 2; 10.1.), heaven and earth (X.2.7; 46.9) Tvaṣṭṛ and water, the Sun and sacrifice (VII.83.3) or Indra and Viṣṇu (VII.99.4). The last

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named pair generated Agni simultaneously with the sun and dawn. Once he is said to be born of the belly of Asura (III.29.4). As regards his qualities and functions, he is the producer of fire and goes in search of other gods of his type located in water and on the earth. As Mâtariśvan he is said to have brought Agni from afar, from Vivasvat, from the gods and from heaven, water and air (I.128.2; VI.8.4). He, in turn, becomes their messenger, knowing all the paths by which he can carry their oblations. It seems from this description of the heavenly Agni that he is both stationary and moving. In some of the passages in the Ṛig-Veda, Agni is directly styled Mâtariśvan; but when the Ṛishis try to personify him as a messenger of the gods, heaven and earth (IV.7.8) as well as the producer of fire, it is his energy of which they are thinking.

The aerial birth of Agni as Apâm-napât is in the waters, for he is the son of the waters (VI.13.3). He is kindled in the waters of the ocean, in the udder of heaven and in the lap of water (X.45. 1.3). He is also termed the embryo of the waters (VII.9.3. I.70.3). Elsewhere he is said to be ocean-girt. Sometimes he is spoken of as the son of the rock (X.20.7). He shines without fuel in water (X.30.4). Three divine females nourish him there, as he is born of a mother who cannot suckle him. Agni in the air-space is also called a raging Ahi (I.79.1) and is also said to have been produced in the depths (budhne) of great space (IV.11.1).

The terrestrial birth of Agni is by friction of two Aranis, fire-sticks, which are his two mothers (III.29.3). The two sticks produce him as a new-born infant who is hard to catch (V.93.4). Ten maidens are also said to produce him (I.19.2).

The peculiarity of these three Agnis is that the heavenly Agni is self-glowing, the airy Agni requires to be kindled and the terrestrial Agni can only be produced by friction. Besides these specific births of Agni, he is also spoken of as born of wood, as the embryo of plants (II.1.14 ; III.113). He is also said to have entered into all plants or to strive after them. (VIII.43.9).

From these various locations and birth of Agni, Vedic scholars regard him as the personification of lightning which manifests

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AGNI.

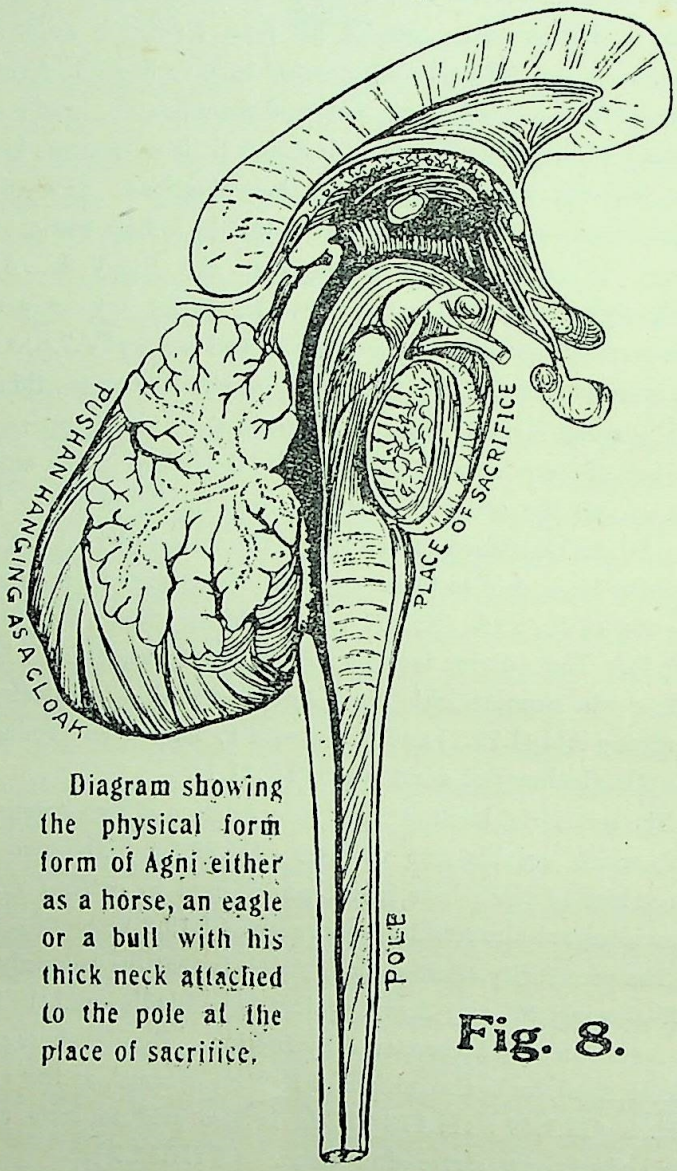

Diagram showing the physical form form of Agni either as a horse, an eagle or a bull with his thick neck attached to the pole at the place of sacrifice.

Fig. 8.

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itself during the development of the storm. Lightning in its unmanifested condition, according to them lies hidden as Agni in the regions beyond the sky. In the aerial region, Agni is regarded as the heat of the Sun. On earth, he is the fire ignited in every household as he is often styled Gṛhapati (VII.15.2), lord of the house, but more particularly, he is the sacrificial fire ignited by the Ṛishis for the offering of oblations. This explanation of the personification of Agni does not fit in with the description of him given in the Ṛig-Veda, where his personal form is likened to a horse (I.49.3 ; VI.12.6), which the seers seek to tame and direct (II.5.1 ; III.27.3). He is also compared to a divine bird (I.164.52). He is said to be the eagle of the sky (VII.15.4). He is frequently called a bull with a mighty neck (V.2.12). Are we to assume from the description of his personal form that when the Vedic seers lit sacrificial fires, their smoky flame rose up to the sky and resolved into various shapes mentioned above, according to the imaginative creation of Vedic Seers? Dr. Macdonell suggests that these shapes of Agni indicate his functions rather than his form, but the attachment of these to a pole at places of sacrifice (II.2.1) or to a pole of rites (I.143.7) is suggestive of his actual physical form, and further suggests that the seers never intended the horse or eagle as a symbol to represent his functions.

As regards the qualities of Agni, he is immortal and enjoys perpetual youth. He is endowed with infinite power and splendour. Though his brightness is very often alluded to, yet his course or track and his fellies are black (I.147.7 ; II.4.6) ; and his steeds, as they move along, make black furrows. His flames rise up to heaven (VII.3.3), touch the ridge of heaven and mingle with the rays of the sun (VII.2.1).

The main function of Agni is that of priesthood. This is specially true of the heavenly Agni, as he is designed as Hotṛ, the chief priest appointed by men and gods (VI.16.1). He is supposed to know all matters relating to sacrifice, adjusts them and worships the gods at proper seasons (X.2.4,5). The Agni of the mid-region is styled "Purohit," an epithet also applied

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to Sûrya (VIII.90.19) whose location is also in that region ; and on earth he is Ṛitvij. He is constantly invoked to honour and worship the gods (III.25.1) ; while they in their turn are said to honour Agni three times a day (III.4.2). He is the father (III 3.4), the king (IV.3.1), the superintendent (VIII.43.24), the banner of sacrifice (III.3.3 ; 10.4). He is the performer of rites (III.3.3), promoting by his occult power (III.27.7), making oblations fragrant (X.15.2) and causing the offering which he protects to reach the gods (I.1.4). He is the destroyer and reviver of human beings.

Though any definite statement as to his anthropomorphic character is absent, yet we can identify him in his biological aspect from his births, locations and shapes which are so definitely mentioned in the Ṛig-Veda. In the internal universe Agni and Indra are the heads of the two portions of the nervous system known as the sensory and the motor. They are also representatives of its involuntary and voluntary activities respectively. Their functions are interdependent. The one develops energy and the other causes expression. The one is incessantly active, while the other is wilful. Agni, from the blackness of his track and fellies, is the grey matter in the cerebro-spinal nervous system and is in contact with the cerebro spinal fluid within it. The topmost portion of this grey matter within the nervous system is the thalamus-the chief sensory ganglion-and is located in the ventricular cavities of the brain, where it appears as a projection evolved out of the belly of Asura, the brain. During the development of the embryo the thalamus is located at the junctional ends of the neural tube which develops into the brain and spinal cord. He is thus said to be born of heaven (the brain) and earth (spinal cord). His birth from the pair Indra and Viṣṇu has also the same significance. From the location of the thalamus at the base of the brain which forms the vault of the sky, he is said to be born of Dyaus (the sky) and Pṛthivî (the spinal cord). The efferent fibres of the thalamus are the flames of Agni with which he supports the heaven (the brain) The mingling of his fibres with the rays of the Sun at the ridge of

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heaven is suggestive of his efferent connections with the corpus striatum which excites the reflex sensory-motor activity of childhood (see Fig. 4). All afferent impulses both external and internal wander up to the thalamus as the chief sensory centre within the nervous system and reach the brain (heaven) and corpus striatum (Sûrya) as efferent impulses. This quality of receiving afferent impulses and discharging them as efferent ones is developed early in foetal life, for the afferent segment of the nervous system comes fully prepared for activity with the birth of the foetus. He is, therefore, called Mâtariśvan.

The shape of Agni, given as an eagle of the sky or a divine bird or a bull with a thick neck, arises from the arrangement of the afferent and efferent fibres of the nervous system in the mid-brain. There the Agni of these shapes appears like a handle attached to a pole—the spinal cord—at its upper end—the medulla—which is the space of sacrifice, the place of unconscious activities which is later to be sacrificed to the higher nerve centres located above it.

The aerial birth of Agni as an embryo or the son of the waters or as submerged in the waters is also easily explicable on the biological basis. The mid-region of the Ṛig-Vedic world is full of waters—the fluid in the rhomboidal space known as the fourth ventricle which is to be found behind the pons and the medulla of the central nervous system. In this ventricular cavity, submerged in water, are located the various centres which control the unconscious infantile activity of the muscles of the sense organs. According to Vedic idea, the pressure of the ventricular fluid acts as an afferent impulse to excite an efferent impulse along the nerves that issue from these centres to the physical organs of senses. Later on, as the child advances in age, the pressure within the ventricular cavity is reduced and is not then sufficient to start an efferent impulse. By that time, however, the sense organs have been educated to receive afferent impulses from without, which excite these centres in the waters to activity. In the absence of pressure or afferent impulses these submerged centres in the water

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have no initiative of action. They are the dormant Agni which must be kindled to emit flames as efferent impulses. The five that kindle Agni in that region are the five senses.

The two Aranis that produce Agni on the earth are the sensory and motor fibres of the spinal nerves. The sensory fibres arborise in the grey matter of the spinal cord and rub against the ends of the motor fibres that issue from it to excite a reflex action which is manifested as muscular movement. This, in fact, is the shortest reflex arc which induces movement unconsciously.

The epithet of Agni, viz., Dvijanman (twice-born), can be explained on the biological basis. After the grey matter within the nervous system is fully educated to respond to afferent impulses, the grey matter surrounding the brain as the cortical area is brought into activity by efferent fibres issuing to it from the thalamus. The excitement of the various volitional centres in it form the second birth of Agni. This occurs only when the child begins to manifest his will in various activities. The second birth of Agni synchronises with the first signs of volition, which are manifested by the child in the cautious way in which he tries to take his first steps.

The qualities and functions of Agni mentioned in the ig-Veda tally more or less with the activities of the autonomic nervous system. The thalamus with his various efferent connections with the sympathetic system is the ruling head of the autonomic system. He is the Hotṛ or chief priest who watches over and controls other minor involuntary centres in the body, though he is not directly concerned with their activities. If these minor centres of automatic activity refuse to do their work, the chief centre and its energy moving along the nerve fibres become exhausted owing to the strain that it has to bear in keeping them in order. Weary of sacrifice without proper help, i. e. nourishment, Agni is not able to fulfil his functions. Varuṇa, fearing that without the high priest who is the regulator of all involuntary actions there will be chaos on the earth i. e., the earthly material of which the body is composed, and anticipating that katabolism will reign everywhere,

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persuades Agni not to give up his duties as a supervisor. Agni demands adequate remuneration for his labour, which is the first and last oblations, that is, the afferent impulse from without the body which comes directly through the sense organs and that from within the body which is relayed last to him. He next demands the juiciest sacrificial portion, that is, the essence of food that is offered as a sacrifice to satisfy Agni Vaiśvânara, who is the double of heavenly Agni-Mâtariśvan in the terrestrial region. The third price which he demands is the aroma of all the herbs, that is, the impulses generated in all sympathetic nerve units, (X.51). These are the various physical functions of the autonomic nervous system which regulate the harmonious working of all the involuntary organs through its katabolic and anabolic fibres, and both these are worked unconsciously through the chief sensory basal ganglion known as the thalamus (Agni-Mâtariśvan). The Vedas are not silent about its abstract qualities, for they say that it is informed with knowledge of the past, (Jâtavedas). He comes to men as a guest (IV.4.10 ; X.91.2), watches the progress of his hosts and protects them if they unknowingly transgress the laws of the knowing (gods). This refers to mens' actions which, done unconsciously, disturb the balance of unconscious activities. He then does all in his power to restore that balance. He acts as a subconscious force and prevents men from doing rash acts. When all the activity of the Sun has departed, when every physical activity is controlled by controlling the Sun, the chief subsidiary centre of motor activity, the power of Agni is visible, protecting the individual and keeping him alive by his divine power. He proves himself the victorious conquerer of the gloom (Mâyâ), its evil spirits, ghosts and goblins i. e. the organs and objects of senses and also magicians and witches, Ahaṃkâra and its background thought. This personified Agni becomes a visible saviour and a strong fortress for the devout. If properly controlled, he drives away all unholy desires as well as other noxious elements i. e. the passions, from the dwelling place of his host, the body. This immortal Agni brings joy to mortals and finds a home in their midst

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(III.5.3, I.6.2). He may be looked upon as a father (VI.1.5) who guides and protects the body that is given to his care. He is a relation (I.26.3) who devises and regulates the working of those autonomic nerve units of which he is the chief ; he is a dear-friend (IV.5.10) to him who controls all voluntary activities ; he is a brother (IV.83.16) to that conscious force that works through the voluntary nervous system, the activities of which he partly shares and helps to carry out. The personified Agni is thus that power in the body which supplies energy to the conscious nervous system in the body that is personified as Indra and gains for his devotee the object of his worship.

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INDRA.

Indra is the most celebrated deity of the Vedic pantheon. From the number of hymns assigned to him, it seems that the Vedic seers concentrated their attention on this god of wilful activity. The seers have described in detail his physical form, his birth and his abstract qualities. He is the god who carries Soma in his belly, strength in his frame, thunder in his arm, and wisdom in his head (II.16.2). He is gigantic enough to grasp the two boundless heavens, which are but a handful to him (III.30.5). In greatness he surpasses heaven, air and earth (III.46.3). The two Vedic heavens are but equal to the half of him (VI.30.1). Heaven and earth do not suffice for his girdle (I.17.3). He holds in his hands a powerful four-cornered Vajra (IV.22.2) which he sharpens like a knife (I.130.4). The Vajra is fashioned for him by Tvaṣṭṛ (I.32.2), his father, whom he slays in order to obtain Soma (I.80.14). This description of the physical aspect of Indra is difficult to reconcile with the storm-theory of scholars who suppose that Indra is the personification of the Thunder God. Indra-hymns are compositions of different sages who were contemporaries, and their imagery, if simply pœtic, would not give us an identical description of his physical aspect. This is possible only when Indra in that physical aspect is visible to all in his concrete form. No theory based on external natural phenomena could explain all that is said about Indra in the Ṛig-Veda. There are a number of hymns full of allusions to Indra's birth, his childhood, his exploits and the like. The various symbolical expressions pertaining to these facts will always remain obscure and nothing coherent or satisfactory can be made out of them, as long as we base our explanation on the pre-conceived idea that the Ṛig-Vedic hymns are descriptive of natural phenomena alone. The sages, sitting in meditation before the fire, perhaps directed their minds to see the working of the structure by which the Creator, Prajâpati manifested himself. They identified

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INDRA.

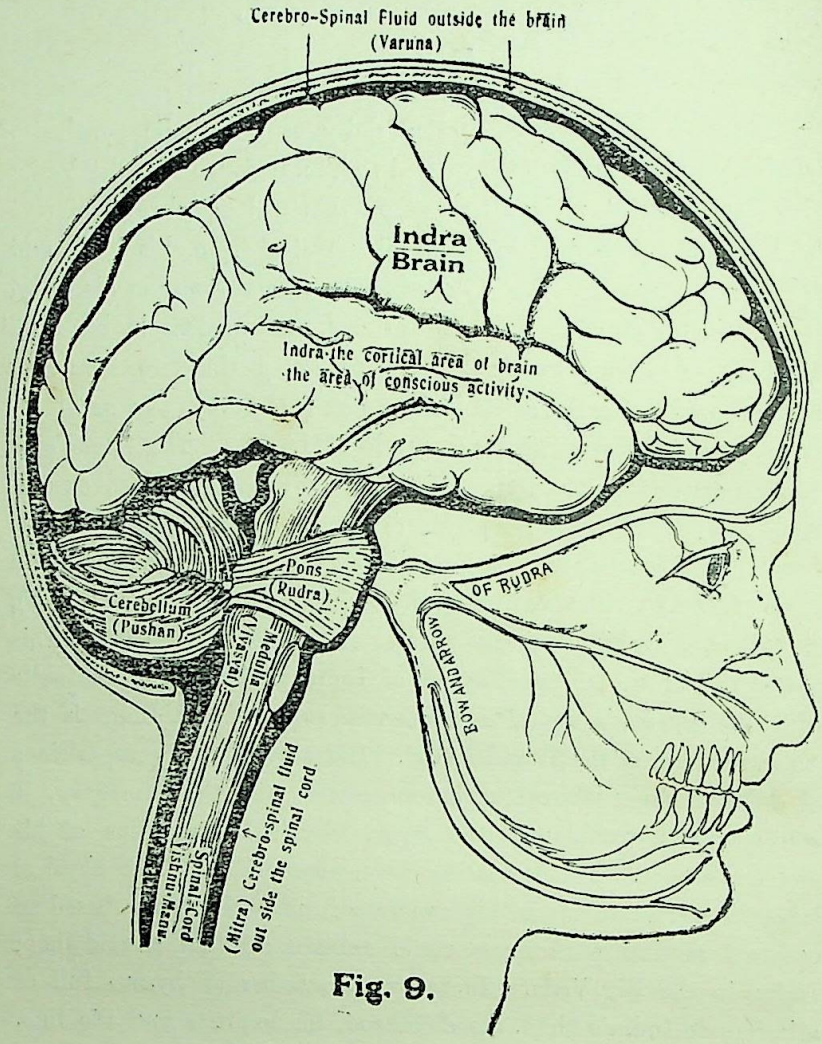

Fig. 9.

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that structure and its activity with external natural phenomena and tried to establish a similarity between them in terms suited to the natural phenomena present in the place of their habitat. To elucidate certain physical facts, we have, therefore, to take into consideration a biological interpretation of the Vedic World, which, as I have already shown is of an entirely different shape and size from the one viewed externally. The various parts of the Vedic world are personified by the Ṛiśis as gods having peculiar births, shapes and sizes.

Though Indra manifests his activities through the air space yet he is an all-pervading deity. His birth is variously related by the seers of the Vedic hymns. He is said to have been unnaturally born through the side of his mother i. e. the embryonic tube of the future nervous system of the body. In the process of development this tube widenes at its sides and is twisted upon itself at its one end to form the cortical layer of the brain, the seat of all consciousness. It encloses within its belly the cavities formed during the procees of enfoldment, the fluid in tube forming the Soma juice which Indra is said to be constantly devouring. The three lakes of Soma, which he is said to have drunk before his fight with Vṛtra, are the three ventricular cavities formed during the enfoldment of the neural tube in the embryonic life and are located in the central part of the brain. He is, therefore, called the "Soma-drinker". As soon as Indra (in his physical aspect the cortical layer of the brain) comes into existence or begins to function, he illuminates the sky—the lower region of the brain—which is violently agitated by him so as to send and receive impulses (Vâyu). Thus Vâyu comes to be associated with Indra. His arms are the two thick cerebral peduncles which also constitute his Vajra, extending as far as the spinal cord through Rudra (Pons) and Ṛibhus (afferent and efferent tracts). He is thus said to rule over heaven and earth. To simplify the regulation of the universe—the nervous system—he locates himself in different parts of the heavens as the Âdityas and Sûrya. The Âdityas are the twelve conscious centres on the outer surface of the brain. They are the motor areas for the movement of (1) legs, (2) arms, (3)

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mouth, (4) lips, (5) throat, (6) tongue, (7) head and (8) eyes as well as the areas for the faculty of (9) speech (10) hearing (11) seeing and (12) feeling. Sûrya, the Sun-god who is located on a lower plane than that of the Âdityas, is the chief subsidiary motor centre at the base of the brain, known as the corpus striatum. It receives all incoming and outgoing impulses to and from the brain.

Indra is borne on a car which is swifter than thought. This is the consciousness that moves along the nerves with the speed of lightning. His car is drawn by two tawny steeds, the two peduncles of the cerebrum where the Sun-god Sûrya is located, just above the peduncles as the eye. The flowing manes which his steeds are supposed to have, are the fibres of the peduncles which spread towards the cortical layer of the brain like a peacock's feathers. These swiftly transmit to Indra the impulses to gain consciousness from a vast distance just as an eagle is borne on its wings. Vâyu, the impulse that moves along the spinal cord, is his charioteer. The gigantic size of Indra is also dwelt upon by Vedic seers in many passages. The two boundless heavens which he is supposed to grasp are the two hemispheres of the brain. The statement that the two heavens are but equal to the half of him, points to the equality of the size of the two hemispheres and also to the fact that the conscious activity of one half of the body is ruled over by the cortical layer of the opposite hemisphere; while the second half of the brain rules its oppsite half. Thus Indra, the cortical layer of both these hemispheres, rules over the conscious condition of the whole body.

The king of this bodily world, he is the lord of all that moves and breathes. Without him the body would fall to pieces. He is supposed to rule over the ancient Seer who is born with the body as the subconscious force and is embodied within us as a result of our past actions. The conscious activities over which Indra rules are of later development. The first manifestation of these is observed about five or six months after the birth of a child, when it begins to direct its eyes to the place from which sound comes. Gradually, as the child advances in age, the conscious take precedence over the subconscious activities, to the latter's serious detri-

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ment ; and Indra attains superiority and pre-eminence over all the other gods. He becomes the Sovereign ruler of the body. He receives all the impressions of the outside world as desires and becomes immortal in the further world of heaven. In this he is helped by his lieutenants, the Maruts, who, by continually carrying afferent impulses from within and without the body, keep his attention rivetted on the objects of desire. These crafty Maruts forsake him just when he lifts up his Vajra to smite down the demon Vṛtra. Indra, by his conscious activity originating in and superceding the unconscious activities of infancy, becomes the "killer of his father" by not allowing the latter to consciously rule the body.

For forty years, indignant at this life of bluster, and gluttony and drunkenness, Indra attempts to control the dark coloured Dasyus, the independent nerve units of the autonomic nervous system, who unconsciously make inroads on his power and try to rob him of his suzerainty. A conscious regulation and suppression of their power of creating emotions and desires, which are of subconscious origin, seem to be the only way open for Indra to bring them under his control. His pugnacity brings him into conflict with Uṣas, the maiden goddess who entered as unconscious force with the birth of foetus. He is even said to cross swords with his chief lieutenant, Sûrya the chief subsidiary centre of all conscious or voluntary activities before the development of Indra. He wrests the power of voluntary movement from Sûrya and puts a check on his activities by directly controlling the conscious or voluntary movements necessary for the satistaction of desires.

A number of anecdotes narrate Indra's conflicts and associations with other gods. They express, in the main, various conscious activities which an individual carries on by means of his will. The one that requires special mention is the celebrated conflict between Indra and Vṛtra, the latter of whom appears also under the name of Ahi, Namuchi, Suṣṇa, Śambara, Vala and others. Vṛtra, who lay on the mountain, ultimately fell before the mighty Vajra of Indra. Vṛtra's demise sets in motion the flood of oceanic

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waters, generates the Dawn and the Sun and liberates the cows. Several theories have been propounded to explain this symbolism. The "Storm theory" of Nirukta, adopted by western scholars, takes Vṛtra to be a demon of drought who holds fast the waters that had evaporated and condensed in clouds, and Indra as a god of thunder and rain is said to pierce through the cloud and loosen the waters in showers. This theory takes the word "Parvata", to mean a "cloud" to suit the root-meaning of the word Indra which is derived from "Indu" the rain drops. Thus when Indra strikes "Parvata" (a mountain) and delivers the pent up waters the propagators of this theory understood Parvata to be a cloud. But there are other facts to prove that this distorting of the phrase to suit their theory is unwarranted. According to this theory the scene of the fight will be visible in the aerial expanse of the external universe. This is in contradiction with the statement made in the Ṛig-Veda where it is said that Vṛtra was killed in distant Rajas region in which ghastly darkness reigned and the region abounded in waters (I. 52.6). Indra is also said to have placed Suṣṇa in the darkness of the pit and killed him in the darkness which was unrelieved by the rays of the sun (V. 32.5.6). In one of the hymns the location of Parvata, translated, as a cloud is described as being in the belly of Indra (1. 54.10). Surely Indra could not have killed the demon of drought, residing in the cloud within his own belly, without injuring himself. In view of this it requires a straining of the imagination to accept this interpretation of the word Parvata as synonymous with cloud. But still this theory fails to account satisfactorily for the phenomena of the generation of Sûrya and the liberation of the cows. Even the "Dawn theory" which is advanced as a counter theory to the above cannot explain all the points in connection with the Indra-Vṛtra episode. According to it, Indra is the Sun exterminating nocturnal darkness, and his rays which throw floods of light on the world of living beings are the liberated cows. But this explains only a part and not the whole of the symbolism.

The "Vernal theory" as advanced by Prof. Hillebrandt

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suggests that Vṛtra is the Winter Monster who soldifies and holds captive the rivers on the heights of glacier mountains and that Indra is no other than the Spring or Summer Sun who frees or liquifies the frozen waters which run in floods towards the sea and set in motion the oceanic waters. This theory also fails to stand the test, for it requires us to believe that the intensity of the season of summer and winter is the same in all the latitudes of the world. Thus all the three theories only account for a part of the Indra-Vṛtra myth. And the strain on the imagination required to follow, comprehend and believe in these interpretations is so great as to make them unacceptable.

Lokamanya Tilak who proposed a new interpretation of the myth, based his explanation on his theory that the original habitat of the Âryans in Vedic times was the Ârctic regions. According to his theory the passages, dealing with the Indra-Vṛtra episode, refer to the annual struggle between light and darkness, for in the polar regions a long night of six months is followed by a long day of an equal length with comparatively long twilights at both ends. If, therefore, Indra is described as a leader or a releaser of waters, the waters are not those in the clouds but the watery vapours which pervade the Universe and from out of which it was created. Under these circumstances, it was regarded as the greatest feat of Indra when he, invigorated by the performance of a hundred sacrifices of Soma, slew with ice the water demon of darkness, released the waters of the rivers to go along their aerial way and brought out the sun and the dawn or the cows from their place of confinement inside the rocky caves where they had stood still since the advent of water. The theory has been ingeniously propounded so as to explain all the details of the Indra-Vṛtra myth. But, based as it is on the prior assumption that the home of the Vedic Âryans is to be located in the Ârctic regions, it loses its force as a universal interpretation of the myth.

The Indra-Vṛtra episode is well explained, as I shall now endeavour to show with the light of the "Biological theory." By this theory it is to be understood as a war between the two states of

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consciousness that rule the physical body—the objective and the subjective. Let us analyse the various details of this episode. Vṛtra is an obstruction causing the waters to remain pent up in the a particular area, which is rugged and elevated like a mountain. The removal of this obstruction causes the waters to flow outside that area. The cows who had taken shelter in the recesses of the mountains are liberated and the Sun once shrouded by these waters, shines forth in all his radiance. The obstacle is removed by Indra who kills Vṛtra by his Vajra and goes down under the name of Vṛtrahan. He is supposed not to have achieved this victory till his fortieth year when he not only over powers Vṛtra but other demons and serpents of the same kind as well.

To understand the whole myth in all its aspects a little knowledge of the anatomy and physiology of the waters that surround the nervous system as well as the waters that are within the nervous system is necessary. The whole of the cerebro–spinal nervous system is surrounded by a fluid known as the cerebr–spinal fluid which exerts pressure on the nervous system from without. The ventricular cavities inside the nervous system are also filled with vertricular fluid which exerts pressure from within on the parts lining the cavity. The fluids within and without communicate with each other through a hole, or foramen, in the membrane which covers the rhomboidal cavity situated at the back of the medulla oblangata and known as the fourth ventricle of the brain. On a level with this hole and guarding the opening is a nerve centre from which starts one of the longest autonomic nerves, the Vagus, which forms the mainstay of the autonomic nervous system. This nerve regulates the flow of water within the ventricular cavities and keeps it at a pressure just sufficient to cause the various autonomic nerve centres situated in the floor of the fourth ventricle to be active. If the pressure within the cavity is excessive the opening is widened to liberate some of the waters outside so as to equalise the pressure within and without the nervous system. This regulation of pressure of the waters is carried on automatically and unconsciously in the body.

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In the early part of his life a man is entirely under the control of his physical or objective consciousness. As he advances in age, he realises that unless and until the unconscious activities, which not only sustain the life but are also concerned in the production of emotions, desires and thought, are controlled, there is no salvation. This salvation can only be achieved by establishing a conscious control over these subconscious activities in order to regulate their working. Hitherto the subconscious activities were unconsciously regulating the conscious activities. To establish its supremacy the conscious wages war against the subconscious and a grim fight ensues between the two. Indra is the conscious force residing in the cortical layer of the brain and Vṛtra and his allies, the wicked demons and serpents are the subconscious forces in the nerve centres which appear as elevated projections on the floor of the fourth ventricle behind the medulla oblongata.

In order to govern these subconscious activities, Indra tries to liberate the pent-up waters in the fourth ventricle by slaying the eldest of the serpents that guard the opening. This victory he achieves by sending conscious efferent impulses through his Vajra, the peduncles of the cerebrum, which act in the floor of the fourth ventricle, with the help of the chief subsidiary motor centre (Sûrya) which was hitherto absolutely powerless to exert control over these autonomic nerve centres. He is thus said to shine by his own glory. The hindrance being removed the waters pour out to the ocean of waters which surrounds the nervous system. The flowing out of the pent-up waters lowers the pressure within the cavities in the brain and that puts a stop to the generation of subconscious activities residing in the elevated nerve centres and liberates them like cows from their confinement.

Before achieving this end, Indra had to forsake the company of his allies, the Maruts (the afferent impulses from within and without), which were concerned in the common everyday exploits of Indra. He had to make himself unimpressionable to achieve this end so as to direct all his energy to the control of the subconscious activities. I am of opinion that this episode of the Indra-Vṛtra

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fight is the germ of Yogic practices and the phenomena of later Yogic literature, the Vṛtra of Vedic literature being replaced in Yoga by the Kundalini. The Biological Theory, thus, interprets the fight between Indra and Vṛtra as a conflict between the conscious and the unconscious from which the former emerges victorious.

Regarded as a whole, the attributes of Indra relate to physical control over the physical body. This activity is manifested through the cerebro-spinal nervous system; but the necessary force for its manifestation comes from Varuṇa, the fluid which surrounds the brain in the subarachnoid cavity, through the cosmic energy that moves in the space that is embodied as the subdural space. Setting aside the exaggerations and allegorical interpretation, as later accretions, we can say, from the location and attributes of the Vedic god Indra, that he represents, in his physical aspect, the cortical layer of the brain with its adjacent tissue, where consciousness—his abstract quality—is said to reside.

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ADITI AND THE ÂDITYAS.

There are no separate hymns assigned to the goddess Aditi. From descriptions scattered over the Ṛig-Veda, her most certain and constant attribute is motherhood of the gods. It is she who brought into existence many of the gods, mentioned in the Ṛig-Veda. Her second characteristic, which is equally prominent, is her power of bestowing freedom from worldly existence. Very wide are the interpretations put on her by research scholars. Some explain Aditi as the personification of the earth. Others have preferred the meaning of freedom and security. A few have associated Aditi with sinlessness. She is also said to be the personification of the Visible Infinite, the endless expanse beyond the earth, beyond the clouds. The Ârctic Theory is silent as to her anthropomorphism. There are many other different speculations of western scholars regarding the nature and character of Aditi.

The Âdityas are said to be the sons of Aditi. They number either seven, eight or twelve. To say anything about them without actually locating the position of Aditi or identifying her with something abstract or concrete in the Universe would be to describe them without any foundation. It is only the physical characteristics of the goddess Aditi, that give us the clue as to her identity ; but these too, are very scantily mentioned as compared with the physical characters of other gods.

Aditi is the goddess who is integral and extensive. She is bright and luminous. She is the supporter of creatures and belongs to all men and also to heaven and earth. She is invoked in the morning, at noon and sunset. She is the mistress of wide stalls. She is invoked to release her worshipper like a tied thief. She is strong in might, undecaying, widely extended, protecting skilfully and guiding.

The wide expanse of the goddess is suggestive, according to the biological theory, of a goddess that rules the surface of heaven

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The Bull-shaped side view of the brain as Indra. It is also described as Adhvaryu and the Pressing stones for extraction of the Soma-Juice. The ruled area shows the expanse of Aditi. The dotted circular area below it is the area of speech personified as Brihaspati.

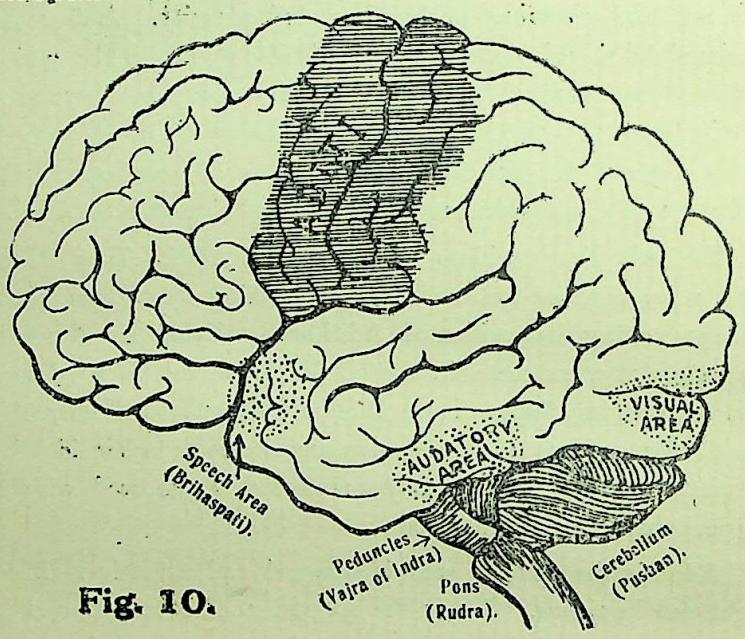

Fig. 10.

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and earth, through the sprouts that spring from it and are called Âdityas. The centres of all our conscious motor activities of the physical organs of sense as well as the movements of head, trunk, arms and legs are located in a particular area on the surface of the brain which is known as the Rolandic area. It extends half an inch on either side of the deep fissure known as the Sulcus of Sylvius. This area is further divided by grooves forming different compartments or stalls of which Aditi is the mistress. The centres of motor activity vary from seven to twelve according to the area that we include. The Rolandic is the executive area. It executes the movements of the head, trunk, limbs and the physical organs of sense (the ears, eyes, nose and tongue) according to the stimulus it receives from these parts. In the absence of any sensory stimulus from without, the centres receive from Dakṣa (thought) their energy to send efferent impulses. Dakṣa is therefore called the mother of Aditi. Elsewhere, Dakṣa is also called the daughter of Aditi and it is the stimulation of these centres by afferent impulses from the organs of sense that produces thought of desire. Aditi is thus both daughter and mother of Dakṣa by reciprocal generation.

The Âdityas are said to be sons of Aditi. Their number is variable though the Ṛig-Veda mentions eight only. With seven sons she approached the gods in the earliest age and cast away the eighth Mârtand, the undeveloped. She brought Mârtand thither to be born and to die again. Without going into details in order to demonstrate the inadequacy of the various theories suggested by western scholars to explain the sons of Aditi, one may say that they are all unsatisfactory. The climax of these speculative theories is reached when it is suggested that the Âdityas are the cardinal points of the compass or that they represent the five planets together with the Sun and the Moon. Tilak in his book 'The Arctic Home in the Vedas' suggests that the Âdityas are seven monthly sun-gods of the Ârctic regions, which cause seven months of sunshine in that region, and darkness to commence in the eighth. By this theory we have to assume that Aditi produced only one son with seven different mani-

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festations of temperature. This is against the fact stated in the Ṛig-Vedic hymns (72.8.9) where eight sons are definitely mentioned. There is indeed, nothing in the verses themselves to suggest the interpretation which Tilak puts on them. In support of his suggestion he lays stress on the word " Pûrvyam Yugam " and translates it as " in the former age " i.e., in pre-Vedic times. His whole version may be interpreted to mean that the Sun in pre-Vedic times remained on the horizon in the Arctic regions for seven months but that in Vedic times, the period was increased to eight months and thus the undeveloped son of Aditi was brought to life to die again. i.e., to return to seven months of sunshine again. To suggest an alternative seven and eight months of sunshine in the same regions appears very curious.

It is only by means of biological interpretation that the legend of Aditi can be satisfactorily explained. The seven sons with whom Aditi started to meet the gods are the seven conscious motor centres in the Rolandic area of the brain. They are the centres for the movements of the head, trunk, limbs, eyes, nostrils, ears and tongue.

The movement of the muscles in a new-born child are impulsive in nature, without assignable peripheral stimulus. These impulsive movements form the raw material upon which the gradually awakening child-will,—which developes by formation of nerve fibres from the sensory-motor area in the centre of the brain to the centres that are located above it,—exercises itself making them its own and transforming them by means of conscious activities, into volitional actions, which are under the control of the cortical area of the brain round about the fissure of Rolando. Aditi is thus said to have started with her seven sons *i.e.* seven centres of muscular activity, to meet the gods that were earliest in age *i.e.* the centres that were concerned in the infantile impulsive activities which are governed by the chief subsidiary motor area known as the corpus striatum. During the progress of Aditi to meet the gods that were before her in existence, she brought into existence her undeveloped son Mârtand, to give expression to her thoughts and ideas. This

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child of Aditi is located at the lower end of the Rolandic area and is known as the Brocas convolution. It is the speech centre which is the last to develop voluntary activity. The constant afferent impulses of sound and light are educating this centre to send efferent impulses to the speech apparatus which is not developed fully before the 9th or the 10th month after birth. In order to speak, the child must first of all possess a sensory and physiological apparatus including an auditory structure for the reception of sound, the inter-central and centro-motor cells, the nerve tracts for the accomplishment of a connection between impression and expression and the organs of vocal utterance (larynx, palate, tongue, lips and teeth). This physiological apparatus is an inheritance from the past, but in the new-born child it is imperfect both in structure and functioning; its development requires the constant moulding influence of those educative influences by which the human being is surrounded from the moment of his entrance into this world. Aditi thus establishes volitional connections to bring her son Mârtand to life. But he is said to die again. This is suggestive of the physiological law of dissolution, according to which the centres which are developed in embryonic life and which begin to function late in life, lose their activity before others when the dissolution of the body occurs. *i.e.* the speech centre dies or loses its function before the death of other volitional centres which are prior in activity to the speech centre. Thus it will be seen why Aditi is the supporter of all men, since no volitional movement is possible without her aid, which is sought from morn till sunset only, for in sleep the activities of Aditi are dormant. She is invoked to release her worshipper who is like a tied thief. Our voluntary activities bind us to existence, in this world and to get freedom from this existence, we must put a stop to all our voluntary activity. This can be done by suppressing all our activities by invoking Aditi *i.e.* by establishing a conscious control over our organs of sense, so as not to generate an efferent impulse in the cortical motor area in the brain.

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BṚIHASPATI OR BRAMHANASPATI.

The personification of Bṛihaspati has been a source of speculation to many a Vedic scholar. He is said to be a deity in whom the prayer of a worshipper of the gods is personified. This suggestion takes the deity out of the groups of the gods that are supposed to represent the various phenomena of nature or physical forces. All the Ṛig-Vedic gods have a definite location in the Ṛig-Vedic world and so also has Bṛhaspati, who is located at the junction of heaven and earth and not in the prayer of the worshippers of the various gods. To reconcile this with the natural phenomena he is said to be the personification of the thunder caused by the clashings of the clouds by the activity of the storm-god Indra. Bṛihaspati, according to this interpretation, can be taken to be the prayer or speech of Indra, the usurper of the power of all other gods. There is no devotional aspect in him, such as is assigned to Agni. Indra never established his supremacy over the gods by prayer but by force. Owing to the peculiar combination of the traits of Agni and Indra in Bṛhaspati, he is regarded as an aspect of Agni as a divine priest presiding over the power of devotion ; but, contrary to this view, Indra, Agni, Bṛihaspati and others are spoken of as distinctive deities in (II.25.3, VII.10.4 ; X.68.9). Others regard Bṛhaspati as the personification of the priestly abstraction of Indra. Some have even gone so far as to associate him with the moon. None of these speculations satisfactorily explains his personality. The Ârctic Theory simply makes mention of him without saying anything further about him. Before we decide upon his biological signification some of his abstract and physical characters, as stated in the Ṛig-Veda must be stated.

Bṛihaspati is a peculiar god in that he has the abstract and physical characteristics of both Agni and Indra. Like Agni he is the priest (I.40.2), the headman of the Âṅgirasas (II.23.8) who produced a noise like Ham-sa (X.67.3); he receives oblations from

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the seven ancient seers—the Âṅgirasas—who precede him (X-67-2); he has a triple location (IV.50.1) which differs from the triple abode of Agni in that it is not distributed over the regions of the world—heaven, air and earth (VIII.44.16; X.27.46,9),—but is located at the junction of heaven and earth (II.23.17). Bṛihaspati is the product of heaven and earth (VII.97,8). He does not himself achieve anything like Agni but gets his work done by the agency of gods, to whom he distributes the oblations he receives. This receiving and discharging of oblations is done by means of the seven mouths and the seven rays that he emits (IV.50.4). The seven mouths and seven rays were brought into action when his existence was assured by the mighty splendour in the supreme heaven (IV.50.4). To secure this favour he had to kill the obstructer or usurper of the oblations—Vala. Bṛihaspati, not receiving the oblations, assumes the powers of and forms an alliance with Indra (II.23.18), who is the only god invoked as a dual divinity with Bṛihaspati. He, like Indra, is called the Soma-drinker (IV.4.9; 1.50.10), Maghavan (II.24.12) Vajrin (I.40.8) and attains the same goal which Indra achieved in the Indra-Vala myth, viz., the liberation of the cows from their confinement and the causing of the dawn and the sun to appear on the horizon (V.60.6; VI.67.3,1). These Indra-like traits appear very prominently in Bṛihaspati, and, in spite of the priestly qualities of Agni in him, I am inclined to believe that Bṛihaspati is more an aspect of Indra and is endowed with only restricted powers of giving expression to the oblations received by him by means of prayer or speech, for there is a definite mention of this in X.44.11 where Bṛihaspati is invoked for protection from the rear, from above and from below, while Indra is invoked for protection from the front and the centre. He is the only God who gets the best of Agni and Indra. He is, therefore, most godlike of gods and, as such, he ranks nearest to Prajâpati and has all his benevolent characteristics (IV.50,6; VI.73,1). His most important achievement is that he causes the Sun and the Moon to ascend alternately—a deed not done by any other god.

All the existing theories have proved incapable of explaining

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the peculiar personification of Bṛihaspati. It is only the biologioal view that will solve the riddle satisfactorily. Bṛihaspati in its root meaning, according to Nirukta, may be taken to signify the protector or controller of speech. He is the god who generates speech, and to understand the personification on the biological basis, we must know the brain mechanism of speech. We have, in the brain, situated at its lower marginal end in the middle, a certain area known as the Broca's Convolution, which, when injured pathologically or accidentally, renders a man unable to speak or give expression to the ideas which have existence in his mind. Bṛihaspati as the god of speech, is closely associated with the conscious and subconscious activities of the mind i. e. Agni and Indra. He through his seven mouths i. e. the openings of the organs of the senses, receives impressions of spoken words which he stores in the subconscious part of the mind and expresses when conscious activities are developed.

To understand these aspects of Agni, Indra and Bṛihaspati we must watch the speech progress of the average child. The little child, even in the cradle and before it is able to raise itself to a sitting posture, is receiving impressions every waking moment from its environment, is hearing the words, seeing the gestures and noting the intonations of those around him; it also emits sounds as infantile babble the overflow of nervous energy. This disposition to utter sounds and express states of feelings has been undoubtedly inherited by him since the very beginning of life and quite independently of all example; the child constantly exercises his vocal organs, which come to him as an inheritance from the past; but in the new-born child they are imperfectly developed, both in structure and functioning, and their development requires the constant moulding influence of those educative agencies by which the human being is surrounded from the time of his entrance into the world. Bṛihaspati, as the speech centre, when he is educated by these processes, assumes the Indra-aspect to excite the motor activity of the organs of speech to evolve sound. His place is then assured in the mighty splendour of heaven i. e. the speech centre. Then he begins to take

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the energy for action from the abstract stimulus of the mind, which is outside the body. The earliest utterances of the new-born have little or no psychic significance. As expression of thought they have none at all. To establish this psychic relation Bṛihaspati, by connection of efferent fibres, has to bring under control or kill the demon Vala (the medulla oblongata), to liberate the cows that are located in the recesses of it as centres of unconscious activity, which are concerned in the spontaneous production of sound by inspiratory or expiratory movement. Later on, as the child advances in age, it produces, babbling sounds in response to certain sensations, particularly of bright light, of peculiar sounds and of a soft warm touch. These sensations are received by the chief subsidiary sensory centre, the thalamus, known in the Ṛig-Veda as Agni and located in the lower part of the brain. This, in turn sends out an unconscious impulse to the cranial nucleii and nerves which supply the speech muscles. A simple reflex arc is thus established between Agni and the vocal organs. The dormant Agni is now brought into activity. This is the stage when the child begins to imitate sounds. The impulsive babble or cry of the child assumes an articulate character. In the next development, the child, to satisfy the internal needs of the body, utters sounds expressive of some meaning by stimulating the motor area of speech in the cortical area of the brain where consciousness is felt. This is the first ray of dawn that appears on the horizon of the provinces of speech, through the constant educative influence of these instinctive afferent impulses from within as well as of the afferent impulses going to it through the auditory and visual centres. Bṛihaspati as the motor speech centre, is at length so educated that he assumes full voluntary control over the apparatus of speech so as to evolve sounds with conscious intention. The Sun of conscious or purposive activity is thus said to rise on the horizon of the province of speech. Bṛihaspati, by the educative influence of these impulses, is now assured of his place in the cortical area of the brain as a sensory-motor area of speech and takes his energy for action from the abstract mind in order to express himself in

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words. He establishes psychic connections ruled by the volitional aspect of the mind, viz., the Will. The imitation of sounds from being passive and subconscious becomes active and conscious, and the words are joined together to give expressions to ideas of constantly increasing complexity. Bṛihaspati thus reaches a stage of ideational or deliberative activity in association with Indra, who rules all other purposive motor activities of the body. He is, therefore, lauded as a dual divinity with Indra. A man in whom this awakening of the will in his speech centre has not occurred, utters words without any meaning. He hears words without understanding them. He is a laggard who is dull in friendship with the will. The correlation of association and dissociation of will with speech are very clearly stated in X.71 of the Ṛig-Veda. The invoking of Bṛihaspati for protection from the rear, above, and below is specially intended to ward off the evil manifestations of all sensory impulses that reach him from the rear, or posterior part of the spinal cord, of thoughts that reach him from above and of the organs of the senses that reach him from below. It is speech that elevates or degrades a man. The constant singing of the qualities of Prajâpati gains for Bṛihaspati his aspect of benevolence.

Those whose speech is sinfully fashioned to spin out their thread in ignorance like spinsters (X.71.9) undergo a succession of births. The specific quality of Bṛihaspati of causing the Sun and the Moon to rise alternately has, I believe, reference to his abstract and concrete functions. The motor centre of speech is the storehouse of spoken and seen words. They must rise to consciousness as thoughts before they are expressed in speech. The material areas of speech in the brain do not themselves originate words which are located there. It is through the agency of Soma that thoughts are brought to consciousness, for, in the Ṛig-Veda Soma is called the "awakener of thought" (VI.47.3) ; he is said to stimulate voice (VI.47.3; IX.84.4), which he impels as the rower does his boat (IX.95.2). He is even called "Lord of speech," Vâchaspati (IX. 26.4; 101.5). It seems, according to the Ṛig-Vedic idea, that Soma has a definite connection with the conscious expression of

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speech. Soma, as the cerebro-spinal fluid, must ascend to exert a certain amount of rhythmic pressure on the motor-speech centre to evolve speech. In fact, all the creative acts of Indra and Bṛihaspati are ascribed to Soma (VI.42.3). He is the exciter of conscious movements.

In the Ṛig-Veda Soma is endowed with entirely abstract qualities. To us his definite function and working in the economy of life is not yet known. How he acts as an awakener of thought will perhaps ever remain a mystery. It may be that an increase of pressure in the cerebro-spinal fluid inside and outside the nervous system has something to do with it. Perhaps it discharges its energy of pressure to the motor centre of speech to excite muscular activity in the vocal organs and thus evolve speech. The discharged energy is again regained as soon as it is manifested in words which are again stored in the motor area of speech for future use. There is thus a see-saw action between thought and speech with Bṛihaspati as the pivot. It is he who impels Soma as the awakener of thought and the Sun as speech to ascend one after the other. The one is still when the other is active. Normally, this differentiation between the two is not felt, for, by degrees the mind becomes so habituated to think only by using its word-instruments that in adult life, thought without words becomes almost impossible. Thoughts, the motor speech centre and the centres of voluntary movements concerned in the production of speech by means of vocal organs form the triple abode of Bṛihaspati. There must exist a working harmony between them. If it is broken either pathologically or accidentally, all recognisable signs of thought are gone, for though a man may be capable of receiving the words of others through his auditory and visual centres, yet he is a stranger to his own speech (X.71.4).

All the facts mentioned in the Ṛig-Veda about Bṛihaspati are explicable on the biological basis, and the mystery about his personification becomes clear when we assume him to be the personification of the faculty of speech.

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SOMA.

Soma is originally the juice expressed from the swelling fibres of a plant. The expressed juice, mixed with honey and milk, is offered as a sacrifice according to the ritualistic details mentioned in the Ṛig-Veda. The plant also from which the juice is expressed is occasionally called "Soma" in the Ṛig-Veda. It is believed to be a personification of a terrestrial plant, whose juice has intoxicating properties. That the Vedic seers, who are supposed to have personified distinct phenomena of nature, should have personified a plant on earth appears to be curious. A few scholars not agreeing with this view assert that Soma in the Ṛig-Veda is a complete identification of the moon. If we analyse the hymns of the ninth mandala of the Ṛig-Veda which sings exclusively the praises of Soma, we shall find that almost all the hymns have common ideas, and where they appear to be divergent it is the imaginative speculation of individual Ṛiṣis that has garbed them in different forms and shapes. The majority of the Ṛiṣis identify Soma with a plant and its juice and have perhaps followed a tradition in pre-Vedic times. A few Ṛiṣis only instead of following the tradition, have tried to identify the qualities of Soma with the qualities of the moon. Nowhere in the Ṛig-Veda is there a distinct identification of the moon with Soma; we have to infer this from their common qualities. If we take the moon as we see it to-day to be the same as in Vedic times, where was the necessity of personifying a body with a definite shape as a fluid one? Soma is said to be the 'Food of the gods,' 'King of gods' 'Father of the gods.' In what way these epithets could be made applicable to the moon it is difficult to imagine. It is true that in the chaotic details of imagery of the Soma hymns, there may occasionally be a veiled identification of ambrosia and the moon, but there is no gainsaying the fact that the vast majority of the hymns describe Soma definitely as plant and juice, and of these two it is the juice that is

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generally personified. The plant is referred to because one cannot speak of its juice without reference to the source.

If we accept Soma as a personification of the plant and its juice, where is the plant to be located in the external or the internal universe ? No satisfactory evidence is forthcoming to support the view that regards it as a plant in the external universe. This famous plant still remains unidentified though some European botanists try to associate it with some kind of Ephedra. If we take the plant as existing in the internal universe and accept its biological character, it is possible that the Vedic bards described the secretion, qualities and functions of this tree within in conformity with the knowledge they had of preparing an intoxicating drink from the expressed juice of a plant of known qualities. The so-called chaotic imagery of the Vedic bards may then be satisfactorily explained. They found a tree in the body which excited their imagination to the fullest extent. The various salient points of this tree were brought out by individual Ṛishis in their hymns according to their power of observation. It seems they vied with each other in the grandeur of their imagination. This has so overlaid the true significance of their utterance that the whole description of Soma has come to be regarded as chaotic and imaginary by research scholars of the Ṛig-Veda.

From the description of the Soma plant and its juice given in the Ṛig-Veda, from the flow of the juice into cups or vats and from the functions that are assigned to it, I am inclined to believe that the Soma plant of the Vedic period is the Aśvattha of post Vedic literature where Soma is regarded as the pent up fluid cosmic energy that nourishes the shrubs or creepers growing on the Aśvattha —the nerve tree in the body. In the Upanishadic literature Soma is regarded as the Moon and her rays as the juice flowing from her which has a vitalising effect on plants. Soma is thus said to be the Lord of plants both in the Vedic and post Vedic literature.

According to the biological theory, the nervous system, which resembles a tree, is personified as the Soma plant and its secretion, the cerebro-spinal fluid within it, is to be identified as the Soma

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juice. We know as yet very little about the function of this mysterious fluid, but in the Ṛig-Veda very marvellous deeds are assigned to it. Its mysterious exhilerating and invigorating action, surpassing that of ordinary food or drink, prompting deeds beyond leads the natural powers, leads to Soma being regarded as the divine, intoxicating drink that bestows immortal life.

To understand the identification of the Soma plant and its juice with the nervous system and its secretion, (to distinguish it from the cerebro-spinal fluid outside the nervous system, I will here call the cerebro-spinal fluid within as the ventricular fluid) I had better describe the origin, distribution, anatomical relations and physiological functions of this fluid as they are known to us today. Through the brain runs a cavity filled with a fluid and lined by highly vascular fringes projecting into the ventricular cavities. The cavity is continuous with the canal in the spinal column. In the brain, however, it does not remain a canal but is enlarged at intervals to form ventricles, or cup-like cavities. Bordering on this cavity are collections of grey matter—the independent nerve units which remain in close contact with the fluid that runs into the cavity. Whether the fluid is a secretion of the brain carrying off the waste matter from it, or is a simple filtration is as yet undecided. Whatever may be the actual fact, it is a means of ridding the brain of substances which are harmful to it. The exuding fluid ultimately diffuses into the veins at the base of the brain and is carried into circulation to excite again the secretion of the brain. The pressure of this fluid in the cavity depends on a balance between the rates of secretion and absorption. When the balance is disturbed by over secretion, certain pathological conditions prevail, resembling intoxication after spirituous drinks such as pain in the head, irritability of the muscles of the body and loss of consciousness. The main function of this fluid in the body is said to be protection and support to the delicate structure of the brain.

The physical description of Soma given in the Ṛig-Veda tallies even in detail with the description of the ventricular fluid given in western anatomy and physiology. The swelling fibres of the Soma

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plant, which are compressed by stones to extract juice out of it, are the fibres of the nerve tree saturated with lymph, the nutriment-carrying material. The brain with its two hemispheres has the largest amount of nerve fibres and owing to its saturation with lymph, causes the pressure within the bony cavity in which it is placed to increase. To keep the pressure normal, the fibres are, as it were, automatically compressed by the two hemispheres of the brain which act as stones. The source of the juice is said in the Ṛig-Veda to be high up in heaven (the brain) and from there, it is said to flow on the earth (the spinal cord) for the benefit of mortals. The lymph, the Soma juice, is milky in appearance. It is then filtered through a strainer of sheep's wool, the choroidcal plexus with its epithelium which looks exactly like a tuft of wool placed in the ventricular cavities. The turbid lymph, by the process of osmosis, filters out to the ventricular cavities as a clear fluid and is called in the Ṛig-Veda Soma-Pavamâna. This purified secretion of the brain flows into three cups or vats—the ventricles—which form the abode of Soma, and, as it remains in contact with the lining of the three cavities it is called Tripurṣa. The mountains through which this juice is said to flow are the projections of the nerve centres bordering on the ventricles. The three abodes designate the three tubs used at the Soma sacrifice of later rituals. Our present knowledge tells us that there are four such vats or ventricles, but this may be reconciled with the Ṛig-Vedic statement of three vats by assuming that they neglected to call the third ventricle a separate vat as it is the smallest of the four. It seems they had a knowledge of this and the intercommunicating recesses between the ventricles and grouped as a 'forest of vats' to which the purified Soma juice has access, as it is said in one of the hymns that "the streams of Soma rush to the forest of vats like buffaloes" (IX.33.1). There is a further process of cleansing which Soma juice has to undergo at the hands of the ten maidens after having passed through the wool strainer. The ten maidens engaged in purifying the juice are the ten cerebral nerves whose nerve centres—the sources of their origin—line the ventricular cavities. The afferent impulses generated by these

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nerves which mainly supply the organs of sense and other vital organs of the body, start vibrations in the fluid so as to keep it clean and to set in motion the exhilirating impulse, the Vâyu. This is the probable explanation of the purifying process carried on by the maidens. The seven sisters, who stand as mothers around the newly born Soma, are the seven nerves that supply the seven openings of the organs of sense. The feast of the gods to which Soma, after being purified flows is the collection of grey matter that lines the cerebro-spinal cavity. The seeking of immortality by the gods at the hands of Soma, points to the idea that the rhythmic pressure exerted by the Soma juice on the collection of these gods keeps them continuously in action to carry on all the involuntary activities of the body. The generation of this activity is the eternal function of Soma in all lives. He is therefore called Amṛita, the draught of immortality. In the Bhagvad-gîtâ it is the encompassed bodily representation of Prajâpati the source of all creation.

The purified Soma is said to drop from heaven and from the air on to the surface of the earth. This clearly tells us that the purification process goes on only in the heaven (brain) and air (medulla oblongata), where the ventricular cavities are located as tubs and in each ventricular cavity there is a strainer like a tuft of wool (the choroidal plexus lined with epithelium). The description of the physiological functions of the Soma juice is too draped in symbolism to allow its veiled meaning to be penetrated. It may be that our present ignorance of its physiological functions prevent us from discovering the hidden meaning. One fact, however, stands out clearly, Viz: that the ancients have assigned to this mysterious fluid a creative function, for they say that it is the producer of rain (Parjanya, the efferent impulse); or it is said to stimulate the voice and is therefore called Vâchaspati. In an adult, speech is a voluntary act but in early childhood, when the child utters his monosyllabic words, the afferent impulses from the ear reach the auditary centre in the ventricular walls and set up vibrations in the fluid, which, in their turn, set up efferent impulses to the organs of speech. Efforts of speech in childhood are more or

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less involuntary. Soma is thus said to stimulate the voice, which he impels as a rower does his boat (IX.95.2). He is also said to be the awakener of thought and emotion and other abstract qualities of the mind. As a generator of plants (I.91.22), he urges into activity the various sympathetic nerve units that lie in the nerve tree as well as those growing over it as shrubs; he is, therefore, called the lord of trees, Vanaspati. Soma, as the bull amongst the cows, has also the same significance. As the lord of rivers he rules, regulates and enlivens the nerves that travel to the organs of sense.

Whatever may be the exact meaning of the chaotic imagery and mystical fancies regarding the qualities of Soma, its physical description is quite enough to identify it with the cerebro-spinal fluid within the nerve tree. It seems that the ancients had a complete knowledge, anatomical as well as physiological, of the cerebro-spinal fluid and that they expressed it under the description and qualities of the earthly Soma juice.

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VARUṆA AND MITRA.

From the description of him given in the Ṛig-Veda Varuṇa appears to be both the physical and moral superior of even Indra, the most prominent figure in the Vedic pantheon. But in the numbers of hymns addressed to him Varuṇa falls far behind his rival Indra. One of the celestial gods, his place is beside Indra himself. He resides midway between heaven and the space above it, encompassing, with his associate Indra, the two Rodas. He clothes himself with waters and makes the inverted cask pour water on the heavens and the earth. The Father beholds Varuṇa in the highest heaven ruling the waters and munificently bestowing rain on all space.

From this description of Varuṇa, scholars were led to think that Varuṇa is a personification of the sky. But this identification seems to be unwarranted, in that Varuṇa is placed beyond the heavens. Some have associated Varuṇa with the sun. This interpretation, too, is unacceptable, for the all seeing sun, rising from his abode, goes to the dwelling place of Mitra and Varuṇa. It is, therefore, evident that Varuṇa and the sun are quite different entities altogether. The identification of Varuṇa with a cloud was suggested by the fact that in the Vedas he is styled as "a ruler of the waters" and "a bestower of rain". But the clouds move about only in the atmospheric regions and not beyond heaven. Tilak's Ârctic Theory presents Mitra and Varuṇa as two correlated bodies representing the half-yearly long night and darkness in the cradle of the Âryan race. Varuṇa as embracing the night, is associated with darkness, and Mitra with brightness. But as against this, it can be shown that both Mitra and Varuṇa are spoken of as shining, bright, sunlike, ruddy and terrible. So after all, Varuṇa has remained the mystery he was, baffling the ingenuity of Vedic scholars. Let us see if the biological view of Vedic gods can suggest a new line of interpretation in the light of which the

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anthropomorphic appearance of Varuṇa may be clearly explained in all its aspects.

If we take Indra to be the cortical layer of the brain what can that be which is located by its side, entirely embracing it? It is the cerebro-spinal fluid surrounding the brain and the spinal cord, the heavenly and the terrestrial regions. That the god is fluid explains why he is said to be clothed in water. The white shining robes which he wears are the two glistening membranes, the Piamater and the Arachnoid. In the space between these membranes that the cerebro-spinal fluid is located which is called the god that rules the waters. By the rhythmic pressure that it exerts, it pours down rain in the form of efferent impulses through the invested cask of the heaven (i.e. the brain) whose convex surface remains in contact with it. The impulse generated by the god Varuṇa flows as rain through heaven (the brain) and spreads over the terrestrial regions (the spinal cord) as showers that permeate the soil (muscles, tissues &c.) to feed the crop in the form of desires.

While western physiologists have failed to assign its proper function to the cerebro-spinal fluid, the Vedic Ṛishis have assigned to it the most important of all functions, Viz., that of generating efferent impulses from the brain. The physical connection between Indra (the cortical layer of the brain) and Varuṇa (the cerebro-spinal fluid) is peculiar in that it is not affected by any band of ropes i.e. nerve fibres &c. How Varuṇa, having no direct connection with Indra, acts as a generator of efferent impulses is a mystery yet to be solved. The Vedic seers explained it by saying that Varuṇa with his associate Mitra works through occult power (i.e. Mâyâ).

The cerebro-spinal fluid is continuous with the ventricular fluid and remains in contact with the chief subsidiary nerve centres of motor and sensory activity, the corpus striatum and the optic thalamus which are known as Sûrya and Agni respectively. This explains Varuṇa's association with Indra and Agni. Varuṇa establishes connection with Sûrya for the performance of an intui-

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tive action. Here Sûrya, the chief subsidiary motor centre, is stimulated to send efferent impulses under the stimulus of Varuṇa directly and not through Indra (the conscious nerve centre). But when Varuṇa's associate Mitra establishes connection with Agni, he stimulates the latter to send efferent impulses to the cortical layer of the brain in order to get consciousness of the impression it receives. How these waters work is still a mystery; Varuṇa and Mitra are therefore called the Mâyins. They seem to carry on their work with the assistance of a set of spies in the form of various nerve centres located in the region of the brain. Varuṇa's messengers descend from heaven (i.e. the brain) and traverse the whole of the earth (i.e. the spinal cord). These centres are twelve in number and go under the generic name of the Âdityas. They are said to look down from an elevation like spies. The efferent impulses generated by Varuṇa in the Rolandic Area of the brain pass on to Sûrya and from thence to the organs of action, visible and invisible. The seven rivers flowing into the jaws of Varuṇa as into a surging abyss are the nerves of the organs of the sense. The nerves of these organs have a special function attached to them which they discharge according to their ordinance. The afferent and efferent impulses moving along these nerves as streams are regulated by Mitra and Varuṇa. They are therefore called the Lords of rivers. Varuṇa regulates the efferent impulses from the heaven and Mitra from the sky.

Varuṇa is said to have a face like that of Agni. His eye is formed by Sûrya (the corpus striatum). His arms and hands are probably formed by afferent segment of the spinal cord that grasp the impressions from outside, and feet by the efferent segment of the same by which he travels to the objects of desire. The two Rodas which he is said to encompass are the two cerebral hemispheres. Varuṇa's ordinances, conjointly with those of Mitra, are fixed by his impressions of past lives and they regulate the actions of men through the agency of other gods. All our conscious activities are ruled over by Indra (the cortical layer of the brain). Sometimes, however, we do an action unconsciously or intuitively, which

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may turn out to be good or bad. This is achieved by Varuṇa who directly stimulates (Sûrya) the chief subsidiary motor centre, without the knowledge of Indra (the cortical layer of the brain). But all these actions must turn out to be beneficial for an individual, as the god Varuṇa is said to be the ruler of all good actions of the mortals. A wise guardian of morality, he himself witnesses the truth and falsehood among men, preceives all that exists within heaven and earth and all that is beyond.

As an omniscient moral governor, Varuṇa towers far above the other deities of the Vedic pantheon. His wrath is roused by sin ; the infringement of his ordinances makes him punish the offender. He sharpens the understanding of the truly devoted. From this, it appears that Varuṇa is endowed with all divine attributes, and guides men ultimately into the paths of virtue and happiness.

As compared with those of Varuṇa, the ordinances of Mitra seems to be more physical and worldly than abstract and spiritual. Both of them, however, have to depend for the carrying out of their ordinances on Sûrya, who receives efferent impulses from Varuṇa and afferent ones from Mitra to produce desires.

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fight with Vṛtra. The waters of the rivers were already moving and not held captive by Vṛtra though he ruled over them (I.52.2; VII. 12.26). Indra had no need to kill Vṛtra to establish control over the waters of the seven rivers (X.49.9). He only changed the course of these waters—which were originally moving in a particular direction under the influence of Vṛtra—by cutting channels with his bolt.

It is only the waters of the sea, which are encompassed in the vats and are held captive by Vṛtra, that were released by Indra and were made to flow upwards towards the ocean. All research scholars of the Ṛig-Veda identify the waters of the sea with the waters of the rivers. I believe they are two separate sets of water, one of which is made to flow at his pleasure by Indra, while the other set of water is made by him to take the particular course of flowing upwards by his mighty power. At what moment of his career, Indra conqured the demon in order to establish control over the waters has been already stated in my explanation of the Indra-Vṛtra legend. The European scholars to suit their storm theory, as well as Tilak to suit his Ârctic Theory consider the fight of Indra with Vṛtra to be an annually recurring one. They base their speculation on IV.19.8, where it is said that through many a morn and many a lovely autumn, having slain Vṛtra, he (Indra) set free the waters of the stream. This is a merely suggestive of a long continued fight extending over many births and deaths rather than an annually recurring one. The waters released by Indra are the waters of the sea, personified as Soma juice which, according to the biological explanation, is the cerebro-spinal fluid in the nervous system.

The task now before us is to identify the rivers which pour their waters in surging waves to the sea. There is a good deel of controversy about the seven sisters of Saraswati or the tributaries of the Sindhu which flow triply seven and seven. It has been suggested by Western scholars that the seven rivers here referred to are the rivers of the Punjab which are flooded during the rainy season with waters released by Indra from the clutches of the

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demon who confines them in the storm-clouds. The rivers may, therefore, it is said, be well described as being set free to flow by Indra. The rivers of the Punjab as we know them are, however, five in number. The difficulty, nevertheless, is got over by suggesting that the Vedic seers must have included, together with the five rivers, any two of the tributaries of the Indus to make up the number seven. Even accepting this explanation of the rivers according to the Storm Theory, it is difficult to understand how Indra dug channels for the waters of the terrestrial rivers to flow either upwards or downwards. These channels formed the guiding reins by which Indra made these rivers to flow at pleasure. There is also no definite mention of what specific rivers were included in the group of seven, which again has given rise to difference of opinion amongst scholars as to the inclusion of two rivers in the group of seven. Maxmüller raises the number five to seven by including the Indus and Saraswati. I have already pointed out that Sindhu and Saraswati could not be included in this as seven rivers are mentioned besides Sindhu and Saraswati. Sâyaṇa includes the Ganges and the Jamnâ in the group. These rivers from their magnitude could not be counted as tributaries nor do they flow towards the Indus. Ludwig and Lassen hold that Kubha must be included at the cost of Saraswati. All these speculations are too vague to be acceptable, nor do they satisfy the conditions associated with the seven rivers mentioned in the Ṛig-Veda.

Lokmânya Tilak assumes the waters of the sea and the rivers to be identical. For reasons already given I regard them to be separate. Nor do I accept the inference that the rivers mentioned are celestial. They are certainly not the terrestrial rivers of the Punjab or of any other place, but that does not mean that they are celestial. The rivers originally had no celestial course. They flowed straight towards the sea to swell its waters, before Indra dug channels for them to flow in. In fact, the waters of the rivers were later on under the dual control of Indra and Vṛtra, the latter of whom is also called the ruler and encompasser of rivers (Nadi-Vṛt). This dual control was not tolerated by Indra. He, therefore, after years of struggle killed

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Vṛtra who ruled the waters of the sea, and liberated the encompassed waters together with the rivers that reinforced the waters of the sea. Indra then could boast, "Bull over all the streams that flow along the earth, I took the seven rivers as mine own domain" (X.49.9).

According to the Ârctic theory, the cosmic circulation of the aerial waters appears on the horizon as seven rays, each followed by its own sun. The seven suns are seven month-gods located in seven different regions and producing seven months of sunshine of different temperature. These suns move by the agency of seven different aerial rivers coming up from the nether world, each with its own sun. This explanation is based on the supposition that the seven-rayed Indra, i.e. the sun, must have some connection with the seven rivers. How the infinite-rayed sun could have a definite number of rays and that too only seven is difficult to accept. The author of the Ârctic Theory solves the difficulty by suggesting that the expression Sapta-Sindhavaḥ—seven rivers—is an old one and was carried by the Âryans with them to their new homes and there applied to new places and objects. This explanation is too far-fetched to be acceptable.

Neither the storm theory, nor the geography of the Punjab, nor the Ârctic theory with its elaborate explanation is adequate to explain the significance and personification of the seven sisters of Saraswati or of the tributaries of Sindhu that flow triply seven and seven. What can these rivers be which have a terrestrial existence and which later on develop a celestial and a terrestrial one. It is only the biological interpretation that can give a proper explanation of the course of these rivers and their ultimate destination. Saraswati, with her mighty stream flowing over the Parvats and Girîs in the atmospheric regions, is the cerebro-spinal fluid within the nervous system. It flows over the masses of grey matter, personified as Parvats and Girîs, the nucleii of the nerves of the organs of sense projecting in the ventricular cavities which form her three abodes. Her seven sisters are the seven nerves which issue from the mountainous masses of grey matter to the seven openings of the organs of the sense. These openings are, two of the ear, two of the eyes, two of the nose and one of the mouth. The water that flows

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in the rivers is the impulse moving along the nerves caused by the pressure exerted by the flood of water confined in the ventricular cavities, for Soma as identified with Saraswati or Sindhu is said to command seven rivers to flow (IX.60.6).

In early childhood the cosmic impulses as waters of nature, are received by the physical organs of the senses and from there the impulses pass along the nerve-fibres as rivers and are merged in the middle flood of the waters, the ventricular fluid which is their chief sea (V.8.8,9). Elsewhere, the waters of the rivers are said to flow into Varuṇa's throat, i.e. the point where the internal cerebro-spinal fluid becomes continuous with the external one. These afferent impulses from outside do not excite consciousness in an infant as they are merged in the area of the nervous system which controls the automatic activities. Though the movements, the child carries out, require peripheral stimuli and are sensory motor processes, yet these do not involve active action or effort. They are will-less. They start from the area of the nervous system under the control of Vṛtra, the chief demon, which is the unconscious area, the atmospheric region of the universe in miniature, the mid brain. As the child advances in age, by constant repetition of these will-less activities, connections are established with the conscious centres in the cerebral cortex of the physical sensory organs by education of the afferent fibres which pass upwards through the cerebral pudduncles—the Vajra, or bolt of Indra. He is thus said to dig out channels with his bolt for the waters of the rivers to flow upwards. It seems that the ancients knew as much as we know now or perhaps more about the way the connections are formed between the physical organs of the sense and the conscious centres in the cortical layer of the brain. A Ṛik in hymn seventy-two of the eighth Mandala proves beyond doubt that the seven rivers mentioned are the seven nerves that go to the physical organs of the sense. In this Ṛik, it is stated that "the seven milk the one and the two create the five, on the ocean's loud-sounding bank". This verse is a riddle which has not been solved by any of the existing theories. The biological theory gives an explanation at once simple and

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appropriate. The seven that milk the one are the seven nerves that go to the openings of the organs of sense. The sensations from these openings travel along the nerves to excite the chief sensory nerve centre (the thalamus) which is situated at the base of the brain. This is the one whom they milk. The two creating the five on the ocean's loud-sounding bank are the two hemispheres of the brain, the outer surface of which, consisting of the cortical area where consciousness is felt, is in contact with the ocean, the cerebro-spinal fluid outside the nervous system. This cortical layer forms the loud-sounding bank where the five sensations from the physical organs of sense are perceived and felt. All our conscious activities are ruled by Indra and are the result of sense impressions received by him. The channels dug by Indra form guiding reins, i.e., the efferent impulses for controlling the impressional activity of these organs of sense, when he takes the seven rivers as his domain (X.49.9). He is then able to control or regulate the manifestations of desire excited by them. Indra is said to achieve this by a war (X.49.9) but not by killing Vṛtra, as a few impulsive movements and very many reflex and instinctive ones persist to the end of life and are still controlled by Vṛtra, the unconscious power in the body. Indra, to do away with this unconscious power which was hindering him in his aim of becoming the sovereign lord of the body universe, waged war against the demon Vṛtra. After continued fighting extending over many births and deaths, Indra killed Vṛtra establishing a permanent control over the unconscious activities as well as over the subconscious activities regulated by the autonomic nervous system.

The seven lovely floods, by which Indra covered the ocean and nine and ninety rivers (I.32.4), are the surging desires, generated by the seven openings of the organs of sense, which Varuṇa, the lord of the ocean, liberates by his occult power, Mâyâ, and are manifested by the organs of action through the nerves that issue from the spinal cord and from the base of the brain to the musculature of the body. It has been suggested by European scholars that the numeral ninety-nine associated with the rivers is used

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indefinitely for a great number. If this be the case, why should a particular numeral be used? Was there a large number of rivers in the locality in which the Vedic seers resided? Tilak associates the numeral with nightly Soma sacrifices performed to strengthen Indra in his fight with Vala, so that he (Indra) may gain a complete victory over the powers of darkness in the nether world. According to the explanation given by the author of the Arctic theory, "the destruction of ninety-nine or a hundred forts of the enemy, a group of a hundred nightly sacrifices, the ninety-nine rivers which Indra is described as crossing during his fight with Ahi (I.32.14) and the hundred leather straps with which Kutsa is said to have bound down Indra and from which he is invoked to free himself (X.38.5), are but so many different kaleidoscopic views of the same idea which makes Indra and Indra alone the lord of a hundred sacrifices." This interprets the epithet Śata-kratu, applied to Indra as the lord of a hundred sacrifices. Tilak takes his stand on Puranic tradition. The hundred sacrifices which are regarded as constituting the essence of Indra-ship are said to be the Aśvamedha sacrifices mentioned in the Puranas. The tradition is substantially the same in either case.

This explanation and interpretation of Kratu in Śata-kratu may be true, but it does not explain why a particular number of sacrifices should be mentioned and this is the point at issue. No satisfactory explanation has as yet been given of the numerals ninety-nine or a hundred. According to the biological interpretation, the particular numeral denotes the total number of nerves that issue from the brain and spinal-cord—the nerves that are concerned in the manifestation of actions. There are twelve pairs of cerebral and thirty-one pairs of spinal nerves; added to these are the seven pairs of special nerves controlling the activity of the involuntary muscles of the body. This gives a total number of 100 nerves. This number varies by deficiency or superfluity, more particularly in the number of the nerves, i. e. special nerves, controlling the activity of the involuntary muscles in the body.

Even in the Ṛig-Veda the number mentioned varies between ninety and one hundred, for Indra is said to have cast his thunder-

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bolt over ninety spacious floods (I.80.8). He is also called the lord of a hundred energies (Śata-Kratu) (VIII.33.14). The thunder-bolts which Indra casts over the ninety floods are the efferent connections between the cerebral cortex with the spinal nerves to excite them to action. The ninety racing steeds, together with four which Viṣṇu sets in motion (I.115.6), are the impulses from the spinal cord (Viṣṇu) moving along these nerves. The variation in the number of the spinal nerves may be due to the peculiarities of the bodies examined by the Vedic seers or to inequality in acuteness of their observation.

The seven nerves going to the openings of the organs of sense, besides being personified as rivers and sisters, are draped in other garbs also. The seven castles which Indra breaks for Purukutsa (I.64.7), are the seven openings of the organs of sense over which he establishes inhibitory control. They are the seven flames of the embodied Agni (I.46.1) i. e. the chief sensory nerve centre which receives sensations from these openings. They are the seven spears (VIII.28.5) which the Maruts, as cosmic afferent impulses, carry. They are the seven Ṛiṣis woh influenced Varuṇa before Indra usurped his powers. They are the seven Ṛiṣis of old, the ancient seven (X.82.2,4), who have the inherent power of carrying on their respective duties which they offer as their treasure in sacrifice to Viśvakarman—the Maker and Disposer—who is mighty in mind and power.

The flowing-triply seven and seven of the tributaries of Sindhu has the same significance as the three strides of Viṣṇu. The triple flow shows the course which the afferent cosmic-impulse takes before it reaches consciousness. The cosmic-impulse dashing along the physical organs of the senses flows along the seven nerves of the organs to their respective nerve centres in the atmospheric region of the nervous system in the body. It then takes a celestial course and reaches the conscious centres in the cerebral cortex. This explanation is further supported by the Ṛik fifth in the twenty-eighth hymn of the eighth Mandala of the Ṛig-Veda where it is said that these (the Maruts) carry seven spears and seven are their powers in the form of their respective functions. The seven glories which they assume are the seven conscious centres which they excite.

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APPENDIX

Principal Works Consulted in the Preparation of the Vedic Gods.

Belvalkar and Ranade	...	The creative period of Indian Philosophy.
Cunningham ...	...	Text-book of Anatomy.
Grey	...	,, ,,
Griffiths Ralph. T. H.	...	The hymns of the Ṛig-Veda translated with a popular commentary.
Halliburton ...	...	Hand-book of Physiology.
Hœrnle A. F. Rudolf	...	Studies in the medicine of Ancient India.
Hug Martin ...	...	The Aitareya Brahmaṇa of the Ṛig-Veda.
Kægi Adolf ...	...	Der Ṛig-Veda. Arrowsmith's translation.
Leighton Gerald	...	Embryology.
Macdonell A. A. ...	...	Vedic Mythology.
Müller F. Max	...	Hymns of Rig-Veda (Sanskrit), Lectures on Vedanta philosophy, Chips from a German Work-shop, Lectures on the science of language.
Patwardhan ...	...	Translation of the Ṛig-Veda(Marathi).
Ragozin Zenaide A.	...	Vedic India as embodied principally in the Ṛig-Veda.
Tilak, B. G. ...	...	The Arctic Home in the Vedas.
The Wisdom of the East series.	...	Vedic gods.
Tracy Frederick	...	The Psychology of childhood.
Vaidya, C. V. ...	...	History of Sanskrit Literature Vol. I Saṃhitas.

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Vyankatesh Samâchar Press ... Suśruta-Samhita.
Warrens, William ... Paradise Found.
Wright Samson ... ... Applied Physiology.
Wallis, H. W. ... ... Cosmology of the Ṛig-Veda.
Yâska ... ... Nirukta.

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